Drinking Light

Designing for a mediated experience

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Päivi Keränen
Aalto University
School of Arts, Design
and Architecture
Department of Media
Media Lab

Aalto University
School of Arts, Design
and Architecture

Author	Päivi Keränen
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Abstract

This thesis explores on the potential practices for experience design through examining the design and production process of Drinking Light, an experiential event concept. The thesis draws upon the literature published on Experience Design, examines examples and concepts emphasising multisensory eating experiences, as well as highlights considerations for designing a mediated experience.

The production part of the thesis describes the creative process of Drinking Light and evaluates its results. The thesis also reflects upon academic literature and similar experiential concepts to identify useful patterns and frameworks to be applied in the implementation of Drinking Light. As the practical result, the thesis presents a tested event concept and its consisting elements (i.e. narrative, light, drink, tableware, interaction, host, setting and location), which together aim to evoke an experience of drinking light.

The evaluation of the Drinking Light experience bases upon the combination of validated AttrakDiff evaluation, a short specially designed structured questionnaire, interviews and observations collected during the demo experiences. The results indicate that Drinking Light succeeded in creating an experience of drinkable light. However, as the evaluation focused on Drinking Light as a novelty experience, no conclusive argument can be offered beyond that. The positive initial response, nevertheless, supports continuing with the concept.

Based on this thesis work, the design effort for aligning proved useful. Especially the combination of methods used to 1) vertically align the experiential elements guided by the identified underlying user motivation, and to 2) horizontally align them in relation to each other seems recommendable.

Keywords

design for experience, experience design, eating experience, prototyping, interaction design, multisensory experience, beverage, AttrakDiff, user study, tangible user interaction

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Tiivistelmä

Opinnäytetyö tutkii mahdollisia kokemussuunnittelun (Experience Design) käytäntöjä tarkastelemalla kokemuksellisen Drinking Light -tapahtumakonseptin ja siihen liittyvien elementtien suunnittelu- ja toteutusprosessia. Opinnäyte pohjaa julkaistulle Experience Design -kirjallisuudelle, tarkastelee esimerkkejä muista moniaistisista ruokailukokemuksista sekä nostaa esiin suunnittelussa huomioitavia seikkoja haluttujen kokemusten synnyttämiseksi.

Opinnäytteen teososa kuvaa Drinking Light -projektin luovaa prosessia ja arvioi sen tuloksen onnistuneisuutta. Lisäksi opinnäyte reflektoi sekä akateemista kirjallisuutta että vastaavia kokemuksellisia konsepteja hyödyllisten rakenteiden ja viitekehysten tunnistamiseksi sekä soveltamiseksi Drinking Light -toteutukseen. Käytännön tuloksena opinnäyte tuottaa testatun kokemuksellisen tapahtumakonseptin ja sen tueksi suunnitellut elementit (tarina, valo, juoma, astiat, vuorovaikutus, vetäjä, tila ja sijainti), jotka yhdessä tähtäävät synnyttämään kokemuksen juotavasta valosta.

Drinking Light -toteutuksen onnistuneisuutta arvioidaan yhdistelmällä eri tiedonkeruumenetelmiä. Arviointi pohjataan validoituun AttrakDiff-arviointiin, lyhyeen strukturoituun kyselyyn, lyhyisiin täydentäviin haastatteluihin ja käyttäjäkokemusten havainnointiin. Arvioinnin tulosten perusteella Drinking Light onnistui luomaan vaikutelman juotavasta valosta. Koska konseptia arvioitiin tavalla, jossa uutuusarvo nousi keskeiseksi, ei tämän pidemmälle meneviä päätelmiä voida tältä osin tehdä. Tästä huolimatta positiivinen ensireaktio kannustaa jatkamaan konseptin kehittämistä edelleen.

Opinnäytteen perusteella pyrkimys suunnitella kokemukselliset elementit tukemaan samaa kokonaistavoitetta osoittautui kannattavaksi. Erityisesti käytetyt menetelmät kokemuksellisuuden linjaamiseksi sekä 1) pystysuunnassa siten, että kaikki osat palvelevat tunnistettua käyttäjämotivaatiota että 2) vaakasuunnassa siten, että kaikki osat tukevat toisiaan vaikuttavat suositeltavilta.

Avainsanat

kokemussuunnittelu, kokemusta tukeva suunnittelu, ruoka, prototypointi, vuorovaikutussuunnittelu, moniaistisuus, kokemuksellisuus, kokemusmuotoilu, AttrakDiff, käyttäjätutkimus

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1

Introduction

This chapter introduces the motivation and objectives behind the thesis and the experiential Drinking Light event concept.

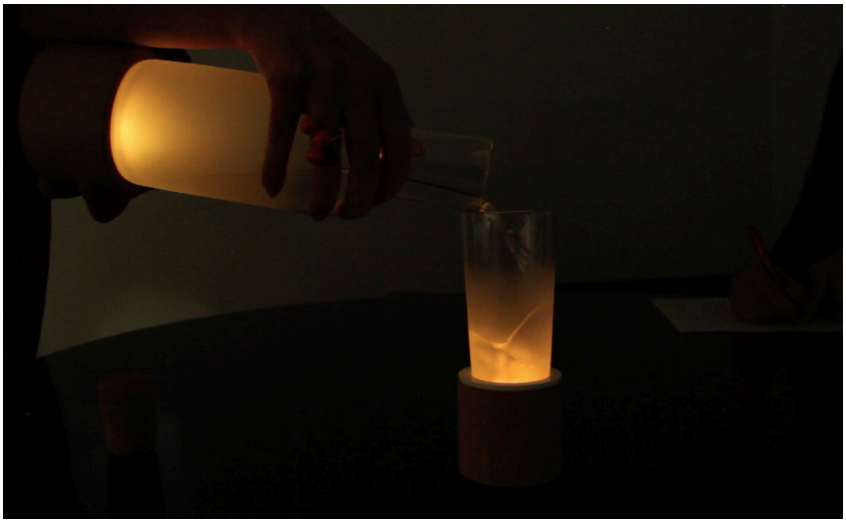

Figure 1.2.1: Drinking Light experience in action

1.1 Motivation

Whether a great meal or event has been organised, the secret ingredient is often, and perhaps rather sappily, described as love. For me that translates mainly as a combination of dedication to work hard, paying attention to details and most importantly thinking of the expected participants – more or less similar to an exercise of good service design. After all this, however, an emergent quality remains, the meal or event either comes alive with the participants or it does not. Often it does, but the emergence is always a sort of surprise, providing intrigue to the process. How can the odds be improved, and is there a formula for a great experience?

Simultaneously, the landscapes of design as discipline are arguably changing, and emerging new design disciplines focus rather on societal or individual needs than revolve around certain product or technology. Catering for these purposes requires a different design approach and practices. Already a decade ago, in 2008, Sanders and Stappers listed design for experiencing as one of the emerging design disciplines (Sanders & Stappers 2008, p. 10–11). Although design for experience has been studied, no readymade solutions or easy paths to follow seem to be at hand. Thus, investigating the tools that the discipline of design can offer for conceiving an experience, and simultaneously describing the exploration process itself seems highly interesting and topical theme for thesis study.

1.2 Objectives and scope of the thesis

This thesis studies the opportunities and practices to design for experience by examining the process of creating Drinking Light, an experiential event concept that concludes the production part of the thesis (Figures 1.2.1 & 1.2.2). The design process to pursue creating the experience of drinkable light commences with research, drawing upon the literature published on Experience Design, examining examples and concepts emphasising multisensory eating experiences, partly in the context of emerging Food Design. From these, the thesis seeks applicable patterns and frameworks for Drinking Light, highlights on a selected set of considerations for designing a mediated experience and translates those into a design brief for Drinking Light. Based on the brief, each element of Drinking Light is described along with their practical implementation in form of an event to demo the experience. To evaluate the successfulness of the design for the Drinking Light experience, a combination of validated AttrakDiff evaluation, a short specially designed structured questionnaire, complementary interviews and observations of users are used.

On its small part, this thesis aims to contribute towards the development of the measures to design for experiences. It describes and reflects upon the attempt to create a highly specific—and in reality quite impossible—experience of drinking light by aligning the sensorial, judgemental/emotional, compositional and spatio-temporal aspects of the event to support its emergence. The design process of different elements and their interconnections all aiming to contribute towards the desired experience are described, and their successfulness analysed based in the findings from the demo experience. As the practical result, the thesis presents a tested event concept, its consisting elements as well as plans for its further development.

1.3 Concept and objectives of Drinking Light

The journey for creating the experience of drinking sunlight started from the Future Eating Experience workshop held in Aalto University November 2016. The idea initiated from the shortness of daylight hours and the darkness of late autumn, and with missing the sunlight. The dark season lasts several months in Finland, the length of it depending on the latitude, often causing overall fatigue and even depression among people.

Food and drink have vast potential to bring us together as well as to nourish us. Beverages can arguably be seen as vessels for multimodal communication; they stir multitude of senses, and can evoke feelings and memories of previous experiences. At the very core of the concept is the objective to embody light into tangible form that can be ultimately consumed as part of oneself in the dark season. In this thesis, the implementation of a concept is explored in the form of an experiential event and its consisting elements. In practice, Drinking Light aims to create a setting, in which light can be poured into a cup, examined, interacted with, scented and finally tasted. With this, it aims to provide a small mid-winter fantasy for those burdened by the residing darkness.

The event concept of Drinking Light focuses on the activity of serving drinkable light for the guests. As eating and drinking can be considered quite intimate experiences, the number of guests served at a time is limited to one or two. The experience consists of narrative and interaction elements, tangible objects and environment, light and drink, which all are designed to work together to create the experience of drinking light.

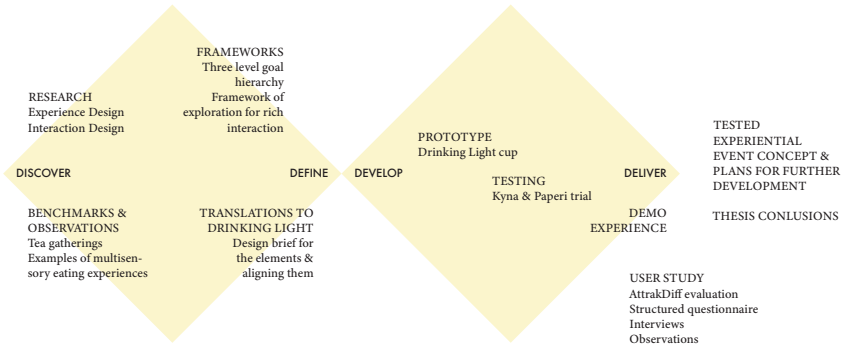

Figure 1.3.2: The thesis and Drinking Light production process visualised according to the Double Diamond model by Design Council UK

2

Experience in the context of design

This chapter explores the phenomena of experience, compiles some of the current lines of thought relevant to Drinking Light found in the academic Experience Design literature, and discusses the reasons to consider experiential aspects in the design.

2.1 Defining experience

To live is to experience. Experiences can be viewed as building blocks of our understanding of the world around us. Accumulative by nature, the previous experiences influence the perception and experience of what is currently happening around us. Thus experiencing is an exceedingly holistic phenomenon, making it hard to grasp and study.

Several attempts have been made to understand the nature of experience. Professor of ubiquitous design, experience and interaction, Marc Hassenzahl differentiates experiencing, which he describes as a stream of feelings and thoughts humans have while being conscious, from an experience with a beginning and end (Hassenzahl 2010, p. 1). Professor of human computer interaction, Jinwoo Kim makes a similar distinction between experience as a process and experience as a result, namely 'an experience' (Kim 2015, p. 18). This thesis work uses this framing of experiencing and an experience as the basic definition.

The experience can be seen as a blend of diverse elements that cannot be easily separated from each other. Nevertheless, several attempts have been made also on this. Based on pragmatist literature, McCarthy and Wright (2004) have outlined four threads of experience: the sensual, the emotional, the compositional, and the spatio-temporal, which they see as ideas to help clarify thoughts on technology as experience. The sensual thread in this framework concerns the sensory engagement with the situation of experience, and leads to think concrete and visceral character of experience. In the context of Drinking Light this articulates in the form and aesthetics of the elements and the sensorial stimuli they produce. The compositional thread relates to the relationships between the parts and the experience as a whole. In Drinking Light this translates to examining the connections as well as the compiled formulation produced by the designed elements. The spatio-temporal thread, in turn, reminds that each experience connects to a certain space and time, and that an intensive emotional experience can change the perception of time and place (McCarthy & Wright 2004, p. 80–93). This, in turn, is addressed in the structure of the Drinking Light experiential event.

Jinwoo Kim, on the other hand, proposes three threads as especially important for understanding experiences: the sensual, the judgemental and the compositional thread. In his framework, the judgemental thread refers to evaluation of the experience through thoughts and feelings similarly to emotional thread in McCarthy and Wright's structure. The compositional thread, however, focuses more on the relationships and interaction between the experiencer and the others, humans and objects (Kim 2015, p. 24–25). The

approach to compositional seems useful for Drinking Light, and reminds to consider all components from the experiencer's perspective. The emphasis on the sensual thread in both formulations seems to support inclusion of the often neglected taste and smell attributes, when attempting to design for an experience.

2.2 Experience design

Given its holistic nature, striving for certain experience as the objective of design action seems somewhat a precarious task. Hassenzahl proposes that experience emerges from a variety of aspects, many of which cannot be controlled by the designer. Nevertheless, design can increase the likelihood of a particular experience to emerge albeit not guarantee it (Hassenzahl 2010, p. 4–6). Kim similarly suggests that designing experiences themselves is impossible, and that designers should instead concentrate on designing for experiences by creating products that can bring added meaning into the life of the users. To pursue this, he proposes a hybrid concept of 'real experience', a process that provides fulfilment through the discovery of the uncommon in the everyday life, thus filling those moments with special meaning. He further argues that for this, three conditions require to be met in design: durability, usefulness and beauty (Kim 2015, p. 18–19, 21). In Drinking Light, the condition of durability can be translated into a clear, unconfusing concept, and a setup that works reliably. The aspect of usefulness can be understood e.g. in terms of the alignment with people's need for the light, the accessibility of the event, as well as with the ergonomics (both mental and physical) of the elements. Finally, the beauty can be manifested in the aesthetics of the elements and interactions included in the event.

Hassenzahl, in turn, offers another set of practical components for shaping experiences by design: functionality, content, presentation and interaction (Hassenzahl 2010, p. 63). In Drinking Light the functionality focuses on afforded action of drinking and technical solutions enabling the interaction with light, content links to enhancing the narrative for drinking light, presentation translates to the explicit design of the elements and the composition of the event and interaction relates to the aesthetics and decisions made in terms of interaction.

Rather than a clear-cut formula, the literature on experience design seems to offer different sets of partly overlapping considerations to be reflected during the design process. This is hardly surprising, when taking to account the complexity of the task at hand. Although consensus or clear definition of terms seems not available in the realm of experience design, in general, the understanding seems aligned enough: experiences are

emergent, but shapeable, and they can be designed for. As the current understanding of experience design seems quite fragmented and general; this thesis, with the focus to study creating a specific experience of drinking light, pursues to contribute towards further understanding on the phenomena, albeit in a very limited scope.

2.3 Why should we care about experiences?

Although no magic bullet is available for creating desired experiences, some good reasons for considering experiences have been identified in the literature. Hassenzahl notes that the technology, for example, will inherently play a role of mediator of experiences and attains its meaning through providing them. The product becomes interesting only when mediating a personally interesting experience. He further claims that "by focusing on creating positive, personally meaningful, and, thus, inherently valuable experience, we have the opportunity to make people happier" (Hassenzahl 2010, p. 2, 38). This also embodies the objective for Drinking Light: to conjure a brief, but joy-evoking escape from the dark, cold winter.

When designing for experience, the material and experiential are tightly interlinked. The material provides a tangible platform and technology for experience to emerge from via interaction. Although the connection is close, Hassenzahl with his colleagues note that in case an artifact pursues to increase happiness, some attention should be directed beyond material representation, and on the experiences created. Design for happiness can thrive from considering the psychological needs, such as autonomy, competence, relatedness, popularity, stimulation, security, and building the design around one or more of them. By successfully implementing this, the designer effectively adds a layer of meaningfulness to the resulting experience (Hassenzahl et al. 2013, p. 22–23). Drinking Light aims mainly to contribute towards stimulation, which emerges from feeling of receiving plenty of enjoyment and pleasure rather than feeling bored by life.

Although no guarantees can be offered on the emergence of the desired experience even with most meticulous design, the odds can be improved by including a design-oriented research approach to the design process as well as consulting and applying on the already available knowledge (Hassenzahl 2010, p. 4–6). Thus, this thesis draws upon what knowledge is currently available on under the theme, and combines those insights with observations from similar experiences as well as with learnings from other relevant fields of interaction and design for multisensory eating experiences described in the following chapters.

Figures 2.4.1 – 2.4.3: The installation Light Collector plays on the concept of encapsulated light

2.4 Inspiring experiences with light

Light affects us humans both physically and biologically. Biodynamic lighting, which emulates spectral and intensity changes of daylight can even influence our biological and psychological processes, as well as our well-being, mood, and performance (Lucero et al. 2016, p. 59). Arguably, in the Nordic countries the relationship with light easily becomes peculiar as the amount of light constantly varies. People react to light, and miss it during the dark season. Darkness during the winter months even contributes to health implications, e.g. seasonal affective disorder is a syndrome with recurrent depressions that occur annually at the same time each year. Treatment with bright artificial light has been found to ease the symptoms (Rosenthal et al. 1984, p. 1). Although Drinking Light focuses purely on conveying a pleasurable experience, and does not claim to offer a treatment or remedy to winter time seasonal affective disorder, it can be noted that to a large number of people the darkness causes a craving for light.

Light has inspired a multitude of art pieces and interactive experiences. The following describes three of them especially interesting in terms of Drinking Light. A similar concept of encapsulating sunlight to be shared and interacted with during the dark winter season has previously been explored in Narim Lee's installation 'Light Collector' (Figures 2.4.1–2.4.3). In Light Collector, the light is captured in jars that start to glow when a person places hands over it. The collection holds six different jars, the northern light, the sunset, the lake, the forest, the winter, and the extractor with a jar. With extractor the participant can encapsulate the current light, which strengthens the believability of the experience (Lee 2016). In addition to similar starting point, Drinking Light shares the same aspiration to create almost magical experience of capturing intangible light and interacting with it. In fact, the Light Collector and Drinking Light could exist in the same alternate reality. The narrative and stories of different lights inspired Drinking Light to address the different variables of the light tasted within the experience.

Light intrigues also with its entity of intangible energy. Espadaysantacruz Studio notes that "Light, as we usually see it, is an element that lacks mass, to treat it under the laws of gravity is somehow magical". To explore on this notion they have created 'Light Kinetics', an installation in which light behaves as a matter under the laws of mechanics (Espadaysantacruz 2015, see also Figures 2.4.4 – 2.4.5). The light appearing to have a mass makes it seem more tangible entity. The same basic thought is utilised in Drinking Light, where light in the cup can be interacted with by pivoting the cup.

Figures 2.4.4–2.4.5: Light Kinetics by Espadaysantacruz

Figure 2.4.6: Light Bodies explores the communicative aspects of lighting and their potential role in public spaces

Susanne Seitinger and her colleagues in turn explore the personal aspects of lighting, and whether the use of portable responsive light could enable a more active relationship between people and lighting. The exploration 'Light Bodies' invited people to engage with their lightscape and surroundings by introducing portable light devices in three different performance settings (Figure 2.4.6). The small acrylic cases with 20 colourful and white LEDs inside responded to audio signals as well as tapping and vibrations (Seitinger et al. 2010, p. 113, 115–116). The design approach of Light Bodies seemingly affording personal interaction with light is highly interesting from Drinking Light perspective. However, the interaction in Light Bodies is significantly more open-ended than in Drinking Light.

The findings published on the Light Bodies indicate interest towards playing and interacting with light, but also found people more inclined to direct the interaction towards either the lights themselves or their immediate surrounding objects, rather than using light objects as means for re-experiencing the surrounding space (Seitinger et al. 2010, p. 119). This seems to support the feasibility of the Drinking Light's approach for very personal and intimate interaction with light.

3

Beverage as a component for experience design

This chapter discusses the use of beverages in design for experience, explores current knowledge on multisensorial eating experiences, and examines different types of tea gatherings as examples of experiences build around a drink.

Figures 3.2.1, 3.2.2, and 3.2.3 (top to bottom): The Ultraviolet dining room transform to convey individual atmospheres for each course with concealed media system / photos: 3.2.1 & 3.2.2 Bakas Algirdas, and 3.2.3 John Kessel

3.1 Why something edible?

When eating, we use multitude of our senses. Food designer Katja Gruijters notes eating as the most intimate of the human functions, consuming the biomatter through the body, tasting it, feeling it in mouth, digesting it and then distributing its elements to support bodily functions (van Hinte 2016, p. 9). Thus, inclusion of edible things seems to entail intriguing opportunities for a design pursuing to evoke a holistic experience.

Eating is an everyday activity, and daily source for experiences for the most of us. The prominent role of food in the different cultures suggests that phenomena of eating goes well beyond securing the required nutrition for survival. The routines, even rituals, related to eating are exceedingly familiar. To intervene and attract attention to such mundane activity Howells and Hayman suggest what they call experimental eating: "Art is a sensory experience, and experimental eating adds layers of smell, taste and texture to visual stimulation that still dominates contemporary art practice" (Howells & Hayman 2014, p. 10). Arguably, the underlying idea could be applied for media as well as to art. The notion relates to Drinking Light: food and beverages can serve communication in addition to providing nutrition. Introducing edible elements into design for experience enriches the sensorial communication with new channels of smell and taste, and increases the intimacy of the experience.

Whether food beverages could serve as standalone medium, however, seems questionable. Much like the general notion of an experience, also the impressions gained from food are largely subjective. On their own, the storytelling means of food are quite limited, especially in cases where no supporting cultural framework of association is available. Food and eating can, nevertheless, convey meanings, when looking beyond the mere pleasure aspect in food and eating (Korsmeyer 2010, p. 140). When combined with other media, food can deepen the experience, and strengthen the narrative. For this, however, having the food taste good does not suffice, but its properties—taste, smell, texture, colour, and other visual appearance—needs to be designed to align with the desired narrative.

Exploring tangible, multisensory, and very personal realm of communication seems both intriguing and worthwhile in order to gain new insights in the current era of highly audio-visual communication. Research suggests that our experiences become richer, the greater the number of sensory modalities stimulated at one time (Schifferstein & Spence 2008, p. 133). Exploring this in practice within the scope of Drinking Light by aligning its different elements seems highly interesting.

3.2 Eating as part of multisensory experiences

The emerging sphere of food design often claims that successful food, aside of tasting good, entails a story to tell. Although the food design is not new domain per se, it lacks a clear definition in the academic literature. Currently, the working definitions seem to be offered by the practitioners, such as the esteemed food designer Katja Gruijters, who describes the food design as "the innovative exploration and definition of all the elements relevant to food consumption" (van Hinte 2016, p. 13). In any case, Drinking Light entails several apparent connections to the concepts of food design. For one, conveying symbolic contents is proposed as one of the driving force of food design (Stummerer & Hablesreiter 2010, p. 17). In the case of Drinking Light, this engine is the drink that symbolises light, albeit in fairly literal manner.

Drinking Light also relates to 'Eating Design', a sub-discipline of Food Design suggested by design researcher Francesca Zampollo (2013), which in its broad definition as "design of any eating situation where there are people interacting with food" connects seemingly closely to experience design. Zampollo further notes the difficulty in designing for eating experience as several of its aspects are highly subjective (Zampollo 2013, p. 184). The issue has been frequently addressed in experience design literature, and some considerations for acknowledging it within the design process are presented in the following chapter.

The practical experience of producing Drinking Light falls well in line with Zampollo's general notion of eating designer's having to design all elements that may factor in the eating situation, and to obtain absolute control over the vast majority of the aspects that influence the eating experience. (Zampollo 2016, p. 4). An example of implemented eating design with an extensive level of control can be found in the Restaurant Ultraviolet by Paul Pairet. The eating experience in Ultraviolet utilises sight, sound and smell to enhance the food through a controlled and tailored atmosphere. The restaurant itself is small with only 10 seats, and the dining room seemingly minimal, but equipped with strictly concealed high-end media systems (Figures 3.2.1–3.2.3). Each course of the menu is dressed-up by lights, sounds, scents, and images that provide context for the taste. In Ultraviolet, the emotion is considered as quintessence of luxury, and its overall vision is to produce "an exclusive experience that shall imprint a memory" (Ultraviolet). From Drinking Light's perspective the combination of minimal, but simultaneously abundantly multisensory format is inspiring, as well as the intangible concept of luxury. Concealing the technology and focusing on the experience served as one design drivers for Drinking Light also.

Another interesting case study on multisensory eating can be found in Ferran Altarriba's and his colleagues 'Mad Hatter's Dinner Party' (2016), which creators define as a novel dining experience enhanced with game thinking, storytelling, and interactive media (Altarriba et al 2016, p. 1). In the playful dining experience guests part-take and solve riddles and tasks, while tasting and enjoying the dinner (Altarriba et al 2016b).

The Mad Hatter's Dinner Party can be seen as an example of eating design, but also of figurative mode of speculative gastronomy, a concept proposed by Howell and Hayman. Speculative gastronomy employs tools, symbols and processes of food preparation to visualise future foods, alternative cuisines or to critique the existing practices. Its figurative mode consists of edible—or drinkable—metaphors, such as the drinkable light in Drinking Light. In the figurative mode the role of audience also shifts to active participants and experiential, haptic and edible aspects of the fiction created are emphasised (Howell and Hayman 2014, p. 21–22). The playfulness and immersive storytelling of Mad Hatter's Dinner Party provides an interesting benchmark and inspiration for the development of Drinking Light although the experiences themselves are quite different in length and style. Nevertheless, both seem to rely heavily on the narrative, while using visual, olfactory, and gustatory elements to enrich it and bring it to live.

3.3 Studying existing tea ceremonies and experiences

To benchmark and familiarise with similar existing experiences to Drinking Light, different tea related event formats were observed. The Japanese tea gathering (also known as Japanese tea ceremony) was studied by visiting an open day at tea house in Suomenlinna (Feb 4, 2018), and participating in a beginners' class for learning basic practices of the art of the tea (Chado Urasenke Tankokai Finland Association, 2003). The Chinese tea gathering (also known as Chinese tea ceremony) was experienced in participation of tea tasting conducted with the gongfu brewing method (Feb 11, 2018), and by discussing further with the tea master of Teemaa tea house and tea shop. In addition, a more contemporary tea tasting event was participated at Thehuone tea shop (Feb 6, 2018). The following paragraphs describe the notions and remarks from these explorations. These descriptive notes do not attempt to provide new knowledge of the traditions of the tea gatherings, but rather serve as notes of experiences and findings that have inspired the design of Drinking Light experience.

Figure 3.3.1 (above): Japanese tea room at Suomenlinna

Figure 3.3.2 (below): Utensils for preparing matcha tea are ceremonially cleansed by the tea master during the tea gathering, although they have already been cleansed before hand. Thiz is done to show consideration for the guests and also serves as an meditation exersise for the tea master

BENCHMARK CASE

Japanese Urasenke tea gathering

At its very core, the Japanese tea gathering aims to serve a good cup of tea and providing an optimum setting for enjoying it (Figure 3.3.2). Simultaneously, it creates a space for quiet reflection, meditation while focusing on the moment and the components of the ritual. Carefully considered and designed ritual of actions, movements, and exchanges seem to provide an excellent setting for contemplation. The exchanges between the guests and with tea master may seem very formal, but also seem to provide a secure framework for communication, while concentrating on individual reflecting and enjoyment of the moment.

Each detail seems to have a purpose based in the convenience or supporting the overall experience. The way of moving in the tea room has formed around the restrictions and affordances of wearing a kimono, and adapting to the environment, which can be fairly dimly lit. As tea rooms often are lit solely with natural light, sliding feet on the tatami floor creates a sound useful for estimating the location of other people in the room. Similarly, slurping the tea not only infuses it with air affecting the taste, but also communicates the action of drinking to the tea master, who can then prepare for the following activities. On the other hand, acting differently from normal life, walking, kneeling and tasting tea in a certain manner, arguably create a distance to everyday life, transforming the perception of the experiencer of the event and setting it apart as special.

Another prominent feature of Japanese tea gathering is the consideration for the guests manifesting in e.g. politeness. While tea room is minimalistic in decor and design and seems secluded from the world outside, the details are carefully modified and placed in respect of the guests and current season (Figure 3.3.1). Visiting the tea room open day, it was explicitly emphasised that the guests are not considered to make mistakes, but rather their mishaps are referred to inefficient guidance by the hosts. Also, potential mistakes are generally not addressed, but rather played to be a part of the experience, thus attempting to preserve the experience as far as possible. The tea gathering celebrates special in the fleeting, current moment with its imperfections and beauty.

Before serving the tea, a sweet delicacy is served and savoured. Since the tea in itself has no sugar, consuming the sweet balances the taste of the tea. Traditionally, only one cup is used to serve the tea to all of the guests one by one. Between the serving different guests, the cup is cleansed with boiling water. With large number of guests, however, other cups can be served directly from the kitchen situated outside of the tea room. The guests are

not allowed in the kitchen. As tea is served to each guest separately, it is also accustomed to bow to the other guests before drinking the tea. If another guest has already drank the tea, then it is customary to bow to acknowledge joining them in drinking tea, bow a second time to apologise other guest of drinking before them, and finally to the tea master saying that you are about to enjoy the tea. Before drinking the cup is turned to face out and after drinking the cup examined before returning it to the tea master with thanks.

The Urasenke tea gathering seems entail many design solutions to induce the experiences aspired in Drinking Light. Although understanding the way of tea would take years or even a lifetime, familiarising with the philosophy, process and ritual even on a very basic level already provided following insights and inspirations to follow, examine and translate:

- Transitioning to another realm; minimal surroundings, and clear transition between the regular reality to the tea room helps to relax and be mindful of the experience and the moments. In Urasenke, the tea room is entered by sliding on the knees, and the belongings are left outside of the room; providing in a very practical manner transferring from the regular life to the tea room. In the design of Drinking Light, this was translated as asking guests to close their eyes in the beginning and imagine an alternate reality.

- Doing something differently than usual also helps to tune in to the moment. Learning to walk, kneel and sit in a different way awakes the senses and helps to focus on the moment. In the design of Drinking Light this translates to the unexpectedness of light in the cup.

- Being cared for and treated as valuable; the care and consideration that are put into preparing of the tea, the personal attention and focus makes the drink special. In the design of Drinking Light this by building up the perceived value by sharing the narrative and origin behind of the drinkable light.

- Time allowed for reflection; in relation to the previous point, providing right amount of wait to establish feel of unhurried atmosphere and allow enough time for taking the moment and observing the surroundings. In the design of Drinking Light this was considered mainly in the demeanour of the host. However, the concept can be developed and explored even further, when more than guest participates at the time.

- Enjoyment of the beauty of the moment is enhanced with attention to detail and polite consideration for the guests. The design of Drinking Light aims to align all elements and stimuli to support the overall narrative. One specific learning taken from the Urasenke style tea gathering was inclusion of potential mistakes and malfunctions as part of the experience and explaining them to guests within the realm of the overall narrative.

Figure 3.3.3: In Chinese gongfu tea gathering, small cups were used for tasting

BENCHMARK CASE

Chinese tea gathering with gongfu style tea brewing

Both Japanese and Chinese tea gatherings share the aim of serving and enjoying a good cup of tea, but the approaches differ. While the Japanese tea gathering seems to build upon structured, orderly ritual to provide space for quiet meditation and mindfulness of the experience, the Chinese tea gathering seems to focus more on the social aspects and free form interaction between guests and the tea master. While Japanese tea gathering uses matcha, a tea prepared from fine tea powder whisked into hot water before serving, and enjoyed freshly made from a single cup, Chinese tea gathering with gongfu brewing technique builds upon exploring the evolution of the taste of tea, when brewing the same leaves multiple times (Teapedia 2013). In a tea tasting event, the tea leaves were smelled first dry from a cup, and then dry placed in a hot teapot, before tasting tea, and finally smelling and inspecting the used leaves that have opened up in the water. Smelling and inspecting tea leafs, in addition to tasting the tea, provided more multifaceted perception of the evolution of the tea leaves during the process.

The approach affects also the design of the tableware; as tea is served from several different brews, the utensils and serving cups are small on the size (Figure 3.3.3). Different vessels, teapot or gaiwan can be used to open up different aspects, and flavours in the tea. After brewing, the taste of the tea is balanced by pouring the tea on a tea sea from the kettle or gaiwan before serving it to the guests. This also allows the tea to cool down a little. Practice of pouring the tea seems to contribute value both to the actual taste of the tea as well as the perceived value of it as intricate pouring method conveys message of caring for the guest and making an effort to deliver best possible tea cup for tasting.

From Drinking Light design process perspective, especially the concept of evolution of tea was inspirational, and translated into the narrative of the light receiving attributes from its surroundings.

Figures 3.3.4 – 3.3.6: Snapshots from contemporary tea tasting event

BENCHMARK CASE

Contemporary tea tasting event

Tea tasting at Théhuone was not based on any formal tea gathering, but rather a contemporary tea tasting event that claimed to aim for increasing the knowledge of tea cultures and good tea (and the demand for good tea as it was organised by a tea shop). In the event ten guests were seated in long table, two pots of tea shared between them, and passed around freely. In addition to different teas tasted, a piece of chocolate and small savoury snacks were offered. Tea leafs were scented in several occasions: first dry tea, then boiled tea leaves, and finally by smelling and tasting the tea itself (Figures 3.3.4–3.3.6). In contrast to other visited events, several of the guests took number of photos were taken of the teas, and social media updates made during the event.

4

Considerations for designing mediated experiences

As an experience is both personal and emergent phenomena, a certain experience cannot be guaranteed with even the most thought out design. A good design can, however, increase chances of a specific experience, and interpretation to take place. This chapter compiles several aspects concluded from literature that provide insight for designing a mediated experience, and contemplates their implications towards Drinking Light.

4.1 Tapping into motivations

Designing for experience requires a holistic approach towards the object of design. It forces the designer to consider the work from various perspectives all starting from the actor, the human involved. For a holistic design approach, Hassenzahl, drawing upon several action theories, proposes on contemplating three level goal hierarchy; a model, where actor's self is related to the world through activity. The three levels include what he calls 1) be-goals, which motivate the action and provide for its meaning; 2) do-goals, which are the concrete outcomes the actor wants to attain with action; and finally, 3) motor-goals that include subset of smaller motoric actions that are required to fulfil the do-goals. Experience, he argues, runs through all these three levels, and integrates them into an inseparable and meaningful whole (Hassenzahl 2010, p. 11–13). This categorisation bears a reminder to address the themes of motivation and meaning of the experience in the design, and to observe the more practical level goals of actions and interactions through this lense to ensure they all align to support the experience.

Based on the benchmark observations conducted for the production part of the thesis, the Japanese Urasenke style tea gathering seems to cater for the be-goal of stopping and pursuing a peace of mind. The do-goals of clearing thoughts and and focusing on the moment and appreciating the beauty of everyday things are guided by the motor-goals nestled within the rituals of the gathering, carefully designed to support the achievement of the do and be goals. On the Chinese tea gathering the emphasis seems more on the need for social gathering, and there the be-goal addressed refers to connecting with others. Thus the do-goals include discussing variations and development of the taste, smell and other experiences induced by the evolution of the tea achieved with the motor-goals of brewing tea several times and serving for the tasting with the different brews.

Drinking Light, in turn, taps into the longing for the light induced by the dark environment common in Nordic societies during winter. Thus, its be-goals relate to an objective of being rejuvenated and energised by light in the middle of dark winter as well as being stimulated with something new and unusual. The do-goals connect to being able consume to light as part of oneself in a very tangible manner. At first sight, achieving the do-goals in Drinking Light appear tricky since the activity of drinking light is not familiar or such that could easily be imagined or missed. However, the action does relate to the familiar activity of sitting down for tea and relaxing for a while. In designing the experience, the identified connection was strengthened by situating the experience in cafe, office kitchen or cosy lounge area, where people would already go to relax and could easily find it. The motor-goals in Drinking Light, on the other hand, conclude from a

pouring drink, operating the cup and so forward. Design choices to align these with the higher level be- and do-goals are referred to in the section 4.3.

4.2 Identifying experience patterns

Although a single experience, in addition to being personal, is always situated in certain time and space, common threads can be found between them. Experience patterns refer to the phenomena in which the core of the experience remains the same although the experiences themselves are played out differently in different situations. These can be utilised for design by attempting to understand the essence of a particular experience and then contextualising the found pattern into the current case and situation (Hassenzahl 2010, p. 17–19). In terms of product experience, identified experience patterns can also facilitate designers' structured attempts to deliberately influence the experiential impact of new designs (Desmet & Hekkert 2007, p. 64). The experience pattern or core essence for Drinking Light can be described as similar to experiencing the first moments of the first sunny day after weeks of gray, cloudy sky (Figure 4.2.1). Although that experience is difficult to dissect, it involves pausing, taking a note of the surroundings, feeling the sun in the skin, becoming aware of the senses, and ultimately feeling connected to world around, like waking up from a dream.

Figure 4.2.1: The first feel of sun after weeks of darkness has similar core essence to what Drinking Light aspires for, picture taken on such moment during preparing the thesis

4.3 Interaction as building block for the experience

Experiencing requires by definition interaction between the experiencer and external world. As an experience is extended over time and can be seen as dynamic phenomena, the order, timing and distinguishment of single moments has impact over the experience as whole. With this insight, the experience design suggests careful scripting of the interaction (Hassenzahl 2010, p 31). In order to design for experiences, designing the interaction is one of the key elements.

The interaction with Drinking Light cup falls under the concept of tangible interaction. In his doctoral thesis Frens (2006) proposed a term 'rich interaction' as a new interaction paradigm for interactive consumer products starting from people's skills and aiming for an aesthetic interaction through the unity of form, interaction and function. His working definition of aesthetic interaction as "the aesthetic experience that only can be had while interacting" relates closely with the objectives of Drinking Light (Frens 2006, p. 56–57).

Although admittedly, Drinking Light consists of relatively simple interaction to be considered as a rich interaction per se, the light lits up and reacts to users gestures and a drink can be poured and consumed. Nevertheless, the Frens' framework for exploration (see Figure 4.3.1)—inspecting the properties of form, interaction and function as well as the relation between these three properties—provided some helpful insights for aligning installation elements in the quest to create an optimum setting for the experience to take place (Frens 2006, p. 57–59).

The exploration of form aims at optimising the aesthetic quality of the form (Frens 2006, p. 60). In the case of Drinking Light this relates to the design of the cup and the pitcher as well as the surroundings for experience as a whole. The form provides a canvas for the experience to take place. As the regular tableware is combined with electronics and sensors, the design has to ensure that chosen form and material both safe for a person to drink the beverage from and remain as unassuming as possible to showcase rather the content, the light than the utensils.

Exploring interaction means exploration of action and reaction between the human and product and pursues at the optimisation of the 'feel' of interaction excluding the form component (Frens 2006, p. 60). In the scope of Drinking Light the interaction includes both the interaction with the host, the light as well as the taste, feel and smell of the drink itself. Also communication about the event can be considered in this context. All these need to align with the perception and feel of light. In the interaction with the cup

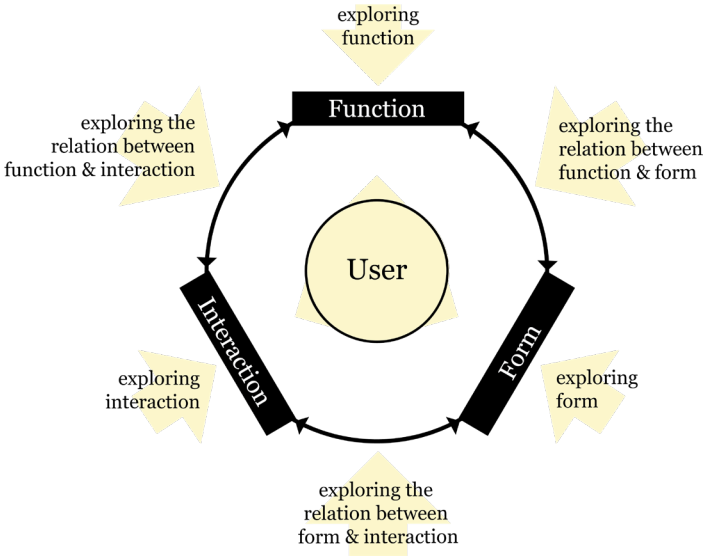

Figure 4.3.1: The framework of exploration for rich interaction, Frens 2006

and light itself, this means a very fast response time to each action. It is also pivotal that the narrative and information that the host offers to the guests supports the interaction with light. The taste and smell are arguably more obscure, but the choices made need to be well justified and communicated to the guests. This notion led to development of the narrative explaining, how the surroundings attribute to the features of light.

Exploring function focuses on optimising the affordance of product for its intended use. According to Frens, the main functionality should be explored in a way that sub-functionalities can be defined (Frens 2006, p. 60). In the Drinking Light the intended use is at its core very simple: on practical level to drink and play with the liquid portraying light. On more conceptual level, the function is to create a perception of transforming light into tangible form that can be interacted with and consumed. To create this illusion the light needs to be believable. The believable illusion of drinkable light is created in the relation between the form and interaction (see Table 4.3.4).

This thesis uses the term affordance similarly to Donald Norman (1999), who focuses on the importance of perceived affordances as he states: "Affordances specify the range of possible activities, but affordances are of little use if they are not visible to the users. Hence, the art of the designer is to ensure that the desired, relevant actions are readily perceivable" (Norman 1999, p. 41). The exploration of the relation between form and interaction aims at optimisation of the expression of affordances available. This includes investigating opportunities to create meaning for action and interaction in the form.

Figure 4.3.2: Testing confirmed that, if using clear cup/glass, the liquid requires some opacity to appear to be glowing rather than just reflecting the light from an external source. A big glass evokes a strong connotation to a cocktail.

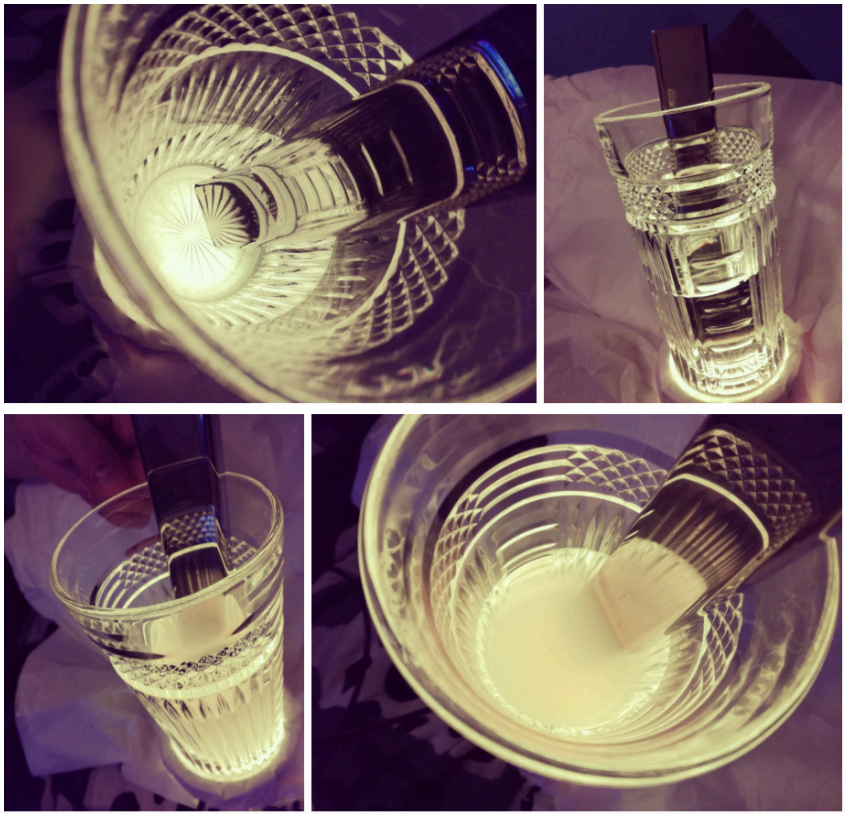

Figure 4.3.3: With a crystal glass clear liquid looks more convincing impersonation of light than with a clear glass. In this context, clear liquid (top row) seems more airy and light-like than the opaque one (bottom row).

The connection of form and interaction runs in both directions, changes made for one of them have implications for the other as well (Frens 2006, p. 60). In Drinking Light, since a cup and pitcher are very familiar objects and as they contain liquid, the basic affordances seem to be relatively clear. The light shining in the pitcher suggests that it can be poured and tasted.

When approaching the form of the cup from the perspective of intended interaction, transluminescence becomes a key aspect of the form. The light needs to be visible for both the person holding the cup and interacting with it, as well as the other guests. Testing with several different cups and liquids indicated that either liquid or cup require some opacity in order to create a believable impression of tangible light (see Figures 4.3.2–4.3.3). As the interaction also includes tasting and drinking the liquid, the size of the cup affording the portion size becomes another key aspect to consider. The nature experience changes according to amount of drink offered, a small amount of drink arguably creates framing for novelty experience of experiment and trial, and larger amount may be feasible for facilitating a more casual moment similar to drinking tea.

Exploring the relation between form and function aims at optimisation of the expression of what can be expected to happen as the result of a certain action (Frens 2006, p. 61). The familiarity of the cup as an interface provides easily recognisable affordances for supported actions. The cup can be filled with liquid, it can be picked up, moved and tilted and drank from. Implementing the design with a cup that has handle would have limited affordances in relation to the directions in which the guests are likely to tilt the cup when drinking. Limited expected directions would in turn have simplified the requirements for the technical setup and ease placement of the sensors affectively. In the current version of Drinking Light cup, however, this affordance is not yet utilised.

Exploring the relation between interaction and function aims to optimise the fit of action with function, and namely to search for the opportunities to create meaning in interaction (Frens 2006, p. 61). The concept is applied in the table below, which aims to ensure that the functionalities, affordances and interactions of the cup are all aligned to support the experience of drinking light. Albeit dissecting relatively simple interaction into a table may seem redundant, in Drinking Light it, nevertheless, helped to evaluate the properties and their significance and alignment towards creating suitable prerequisites for the experience.

	Affordances for practical actions	Interactive responses induced
Overall functionality *Conceptual aim:* Create an impression of light as a tangible artifact that can be interacted with (incl. consuming it)	To drink and play with the liquid	The interactive setup as a whole
Sub-functionality 1 *Conceptual aim:* Create the illusion of liquid being a tangible manifestation of light	Pouring liquid into the cup	Light lits up instantly as the liquid is poured into the cup
Sub-functionality 2 (not implemented yet) *Conceptual aim:* Indicate that the tangible light is "friendly" and can be interacted and played with	Picking up the cup	Light is strengthened in order to provide feedback and to communicate the connection
Sub-functionality 3 *Conceptual aim:* Enable user to play with light, and strengthen the illusion of light as tangible liquid	Pivoting the cup	The light follows the movement
Sub-functionality 4 *Conceptual aim:* Enable user to consume the light as part of herself/himself	Drinking the liquid	The light goes out as the cup is emptied

Table 4.3.4:
Aspired functionalities and sub-functionalities of the Drinking Light cup examined against the affordances and interactive responses induced

5

Drinking Light

Drinking Light aims to offer affordance and mediate an experience of tangible, consumable light to be enjoyed during darker months. This chapter introduces the thinking behind of Drinking Light, its elements and the overall experience.

Figure 5.2.1: The final demo prototype glowing in the dark room / photo Luis Priace Michavila

5.1 The need for Drinking Light

Identifying situations in which systematic deprivation of a need can be considered an important starting point for experience design (Hassenzahl 2010, p. 56). The northern location of Finland creates a setting for somewhat special relationship with light and the sun. The amount of light varies significantly depending on the season. The summers with long light nights are leveled with the darkness of the winter afternoons, making light a typical topic for conversations.

The constantly changing amount of environmental light seems to make it something that people are acutely aware of, and something that is generally graved for when it is on low supply. Although, Hassenzahl (2010, p. 56) notes that the true challenge of experience design lies fulfilling needs in non-obvious way, arguably, in this case the need's simultaneously specific and abstract nature can stand fairly literal translation. Arguably, facilitating drinkable light may also be considered somewhat unexpected solution for the craving of light.

5.2 The elements of Drinking Light

Design for experience requires thoughtful alignment of the elements, which work as the sources of stimulus for the experience itself. Just as important is pursuing to exclude noise, external stimulus that would distract or contradict with the realm of the experience i.e. break the illusion. In designing Drinking Light (Figure 5.1.1), simplicity was pursued by attempting to limit the number of elements, and by this to allow enough time to carefully consider each of them as their own entities, but especially in connection with the other elements. The following paragraphs describe the rationale behind each element as well as their desired properties, which served as the brief for implementation.

5.2.1 The narrative

The narrative serves as the backbone and backdrop for the experience, explaining and offering a rationale on how what would normally considered impossible is nonetheless possible within this setting. It weaves in threads from natural reality and combines them with fantastical ones that still appear to follow reason within the scope of the alternate reality introduced.

Rather than relying on visual presentation on the realm of Drinking Light for the introduction, tapping into the imagination of the experiencers seemed more appealing for several reasons. Firstly, the drinking light falls under the sphere of make-believe, and to set the mood accordingly benefits from spurring imagination. Secondly, the approach with short personal reflection offers the participants a change to breath, calm down, and tune in for the experience, distancing themselves from their current occupying thoughts; a similar transition was identified to be part of Urasenke tea gathering. Thirdly, open ended description of the Drinking Light reality leaves space for discussion and wonder. Finally, albeit not very flashy, this is also an exceedingly cost effective and easy to develop way for painting the picture and establishing a setting for the experience.

Introduction to Drinking Light:

> *"Imagine a reality in which the light is tangible, and can be played and interacted with; where the sunlit can be brushed off from the surfaces, seen and felt in the fingers; smelled, and tasted.*
>
> *The light, as we know, is influenced by its surroundings, taking up attributes and qualities as it travels through the atmosphere, and then reflects and diffuses through different materials. Each light is individual. This is why, in this reality, there is a guild, a specialised trade of 'Light Gatherers', who travel the world in search of interesting lights, then collect them, and take them with them to be later shared to lighten up the darker hours.*
>
> *Thus, in this reality, even amidst of the darkest winter, light can be introduced, celebrated, and shared.*
>
> *Open your eyes and you are here..."*

The narrative is enhanced by placing the shining light bottle on the table while sharing the narrative so that it is the very first thing the guest sees, when opening eyes. After this, the background of the light to be tasted is shared with the guest, while pouring the light into the cup. Research indicates that the way in which a food is described, can significantly influence how it tastes, and even how much it is liked. The name and description can provide a label in which to connect an otherwise potentially ambiguous flavour experience, and help guide the attention to certain features (Spence 2014, p. 147–148).

Thus, sharing a narrative describing also the origins of the drinkable light can be considered key for delivering the best possible experience.

Important to consider is that the description sets expectations for the taste, and that it thus needs to align with features of the drink. Hedonically evocative descriptions can turn against themselves. However, minor disparities should not pose a problem, and raising expectations slightly higher than what is in fact offered can even improve the experience by guiding the guest's perception of it (Spence 2014, p. 163, 170). Rather than reflecting the taste itself, the descriptions offered in Drinking Light focuses more on supporting the narrative by describing the place where this specific light was collected, and by providing a narrative context and explanation for the gustatory nuances of the drink. The chosen approach was also inspired by the evolution of tea found in the gongfu brewing style tea gathering as well as Narim Lee's installation Light Collector.

5.2.2 The light

The light is a pivotal element in Drinking Light, it is the hero of the piece and plays key role in the interaction. The light appears and disappears in the cup and the pitcher with the liquid, persuading the viewer to consider them to be the same. Thus, the colour, tone and strength of the light and liquid combined are both means of communicating, and aesthetic elements that largely affect the feel of the experience. In the demo experience, a warm yellow light with slightly pinkish tone was chosen to convey warmth and hints of approaching spring.

5.2.3 The drink

The drink portrays the physical manifestation of the light. Thus, the element of drink is tightly connected to the light element, and were designed in unison. For the drink to work as one of the media in Drinking Light, following properties needed to be considered:

The level of translucency of the liquid balances between enough transparency to appear light-like and enough opacity to catch light and appear to be glowing rather than just reflecting the external light. The combination of the colours of liquid and the light need to appear sunlight like.

With the taste, scent, and warmth of the drink two alternative approaches were considered: 1) aligning them according to the story of the light, and seeing that they are justifiable; or 2) playing upon the mystique of light, the concept of drinking light is foreign and the taste of light is not known. Finally, in Drinking Light combination of these approaches was chosen with both familiar and recogniseable elements and more strange and unfamiliar hints to stir imagination. The texture of the liquid needs to be clear and fluid to align with the perception of weightless light.

5.2.4 The cup and pitcher

The cup and pitcher serve as a canvas for the light, container of the drink, and the cup also as the primary interface for the interaction between the guest and the light. Aesthetically and interactionally the cup and pitcher need to form a coherent entity. The light needs to appear and act similarly in them both to induce the perception of light being tangible and poured from vessel to another. To support the experience of drinking light, the cup aims to appear as normal and unassuming as possible. Thus the electronics, sensors and LEDs included in the setup need to be hidden and camouflaged. By simple and familiar looking design, the attention of the guest is focused on the contents: liquid that seems to be light.

Since in this case, the glass that works as the base for the setup, was not especially designed for the purpose, but selected from the ready made glasses available, properties like height, bottom radius, shape, transparency/translucency and so forward were key considerations in making the selection. The process of prototyping the cup and producing the demo cup is described in more detail in the chapter 7.

5.2.5 The interaction

The interaction is key component to most experiences, and the ability to interact with the elements creates a feel of the illusion being real, as well as strengthens the immersion. Interaction in Drinking Light aims to persuade the guest to believe in the narrative, by providing evidence on tangibility of light within the scope of the experience.

The interaction between the guest and the cup is fairly simple, a light lits up when liquid is poured into cup and turns off when the liquid is gone. A cup is exceedingly familiar as an interface and does not require learning. However, some aspects are crucial for making the interaction believable: 1) as light is perceived to be the fastest thing to travel in the

universe, and thus any delay in the interaction would instantly break the illusion, and 2) all interactive responses have to support and strengthen the desired experience of tangible light. For this, an option of playing with the light by tilting the cup was added. Section 4.3 describes how the elements of Drinking Light were aligned from interaction perspective.

The interaction between guests and the host links to the narrative, and serves to reflect the experience itself within the scope of Drinking Light reality, discussing e.g. what type of lights would be interesting to taste, and what they might taste like. Maintaining the narrative within the interaction is guided by the host.

5.2.6 The host

The host welcomes and guides guests to Drinking Light experience. The guidelines and structure for the host's interaction, actions and gestures within the experience, were ideated by considering, how one would present the experience and its alternate reality to a friend, thus attempting to create a personal, warm and safe context for the experience. Tea master's conduct both in Japanese and Chinese tea gatherings provided another aspect to with the host actions were reflected upon. Planning a ritual like process to serving the drink – or better said – the light in Drinking Light not only conveys the feeling of care and appreciation, but also provides the host a memory serving structure to make sure each detail is addressed in order to support the emergence of the experience. In addition, following a choreography benefits creating more similar setting for each Drinking Light experience, which benefits the objective of analysing, and evaluating the outcomes of the performance.

5.2.7 The setting and location

As noted, experiencing is a constant flow without a clear beginning or an end, and each experience is also perceived based on previous experiences. Thus the location, and context of the experience setting influence the overall experience. From practical side, the experience venue should be easily accessible, and provide relaxed setting for playing and sparking imagination. As the experience is quite intimate and personal, the setting needs to provide some shelter for the experiencers, and block some external sensorial noise that might break the experience, but also remain inviting enough to draw people in and encourage them to participate.

In order to focus on the desired core experience of drinking light, the design of setting is simple and minimalistic. All items included have purpose that supports the overall experience, and spatial set-up consists of a canopy, a table, a soft mat and pillows to sit on (Figure 5.2.1–5.2.2). Sitting on the floor instead of chairs aims to lead experiencers back childhood, to encourage the childlike imagination within them, and thus to ease the acceptance of seemingly make-believe experiences by reminding perhaps a hut or such places of the childhood used for telling and listening stories. It is also differentiation from a regular cafe experience, distinguishing it from the similar events. The cosy and secure setting aims to provide a quick escape from hectic everyday life. The canopy structure aims to alleviate guests' potential feeling of being on display, and aid them to focus on the moment, and designed experience.

After initial user observations, however, the canopy structure was left out from spatial setup of the demo experience.

5.3 The structure of the experience

The event of the experience begins by the guests being welcomed and seated by the host. After short small talk to establish initial trust, the guests are requested to close their eyes for the moment and imagine the reality described by the narrative. Meanwhile the host prepares and places the bottle with light inside and glasses on the table. After the narrative has been shared and the table has been set, the guests are asked to open their eyes in the described reality so that the first thing they see is the glowing bottle and glasses. The host will then present the background of the light to tasted, where it has collected and what nuances may be found within it, pour the light into the glasses, and hand them to the guests. After the guests have tasted the light, the experience is shortly discussed, whether the light tasted as expected, what type of light would be interesting to taste, and how the experience was in general. Finally, the tasting event is closed by thanking the guests for participating and tasting the light.

Figure 5.2.1–5.2.2: Sketch and implemented spatial design for the Kynä & Paperi trial

6

Creating the cup for Drinking Light

The cup provides main canvas and interface for the user interaction within the Drinking Light experience. This chapter describes the design and iteration process of it.

Figures 6.1.1–6.1.6: Examples of cups with similar functionality, these cups are acrylic and function with blinking LEDs

6.1 Benchmarking similar products

The general idea of drinkable light has already inspired other products. Similar concepts have been pursued with designing e.g. party drinks that glow under blacklight, and glowing ice cream utilising fluorescence enzyme discovered in jellyfish and fireflies. Cups with a property of a led lighting up as the liquid is poured in are also in the market. Based on the small online review conducted for this thesis, the functionality currently appears in inexpensive acrylic cups, mainly intended as the party apparel and novelty items; often with blinking, multi-coloured lights (Figures 6.1.1–6.1.6).

Although the core functionality remains similar, the look and feel of these glasses differs significantly from the one aimed with Drinking Light. The combination of material, colours and flashing lights draw no connection to nature, sun or tranquillity, but rather the opposite. The functionality being limited to the cup lighting up with liquid and going out when it is gone, would arguably not suffice for the intended Drinking Light experience either.

Nevertheless, the existing products seem to suggest interest and market for the concept. For this thesis, the existing examples were found on eBay, Alibaba, Gumptrade, AliExpress, and Amazon with such search phrases as "liquid activated mug", "liquid induction glass", and "magic LED glass". Although the basic functionality appeared the same in all of them, many with flickering LED lights, some provide an option for altering led colour. The main differentiating property seemed to be the design of the cup. The prices ranged from two to ten Euros a piece. Beyond this, the online marketplaces provided only limited technical descriptions.

In addition, several do-it-yourself versions on the basic functionality are presented online. Most often these utilise similar technique as was implemented in the first Drinking Light prototype i.e. having two conductive items placed in the bottom of the cup. Food safety aspects of these, however, remain unaddressed, and solutions appear intended for more of a novelty than extended use. Another method utilises placing two plastic cups within each other and including a pressure sensor between them. Given that the existing products do not cater the design objectives of Drinking Light, assembling a custom-made version seems prudent.

6.2 Prototyping the cup

Although acrylic glasses with similar functionality already exist in the market, developing a well-functioning cup with desired properties to support the overall experience proved a time consuming task. On the other hand, exploring and testing the potential technical solutions provided a personal learning experience in working with the electronics, sensors and producing the parts needed for the cup. Even that the concept is simple, the implementation proved to entail many practical trade-offs, affordances that had to be considered in the design of both the cup and the experience. Some of these might have been possible to avoid with more extensive technical skill, but, nevertheless, a working cup with desired attributes was finally achieved. The following paragraphs introduce the process of prototyping and developing the cup in further detail.

Mock-up

Set-up	A paper cup with small LED candle
Functionality	A simple visual mock-up, no working functionalities or liquid involved
Findings	The concept seems to work and is interesting, the light that is casted to the face of the person taking a sip seems to work as a feature that supports the narrative.

Prototype I - a working proof-of-concept

Set-up	A paper cup with two copper tape strips inside, which form a closed circuit, when liquid is poured in to the cup (with low 3,3 V voltage this remains safe to drink and unnoticeable for the user), one neopixel led, velostat pressure sensor, Arduino (Figure 6.2.1).
Functionality	The light lids up, when liquid is poured into cup flickering slightly, changes to a warmer tone as the cup is picked up, and turns off, when the liquid gone.
Findings	There is a sense of magic, when pouring liquid instantly lights the cup. Although copper can be considered a food safe material, the copper tape strips looks a bit unappealing and get in the way of l ight. Having wires disturbs the effectiveness.

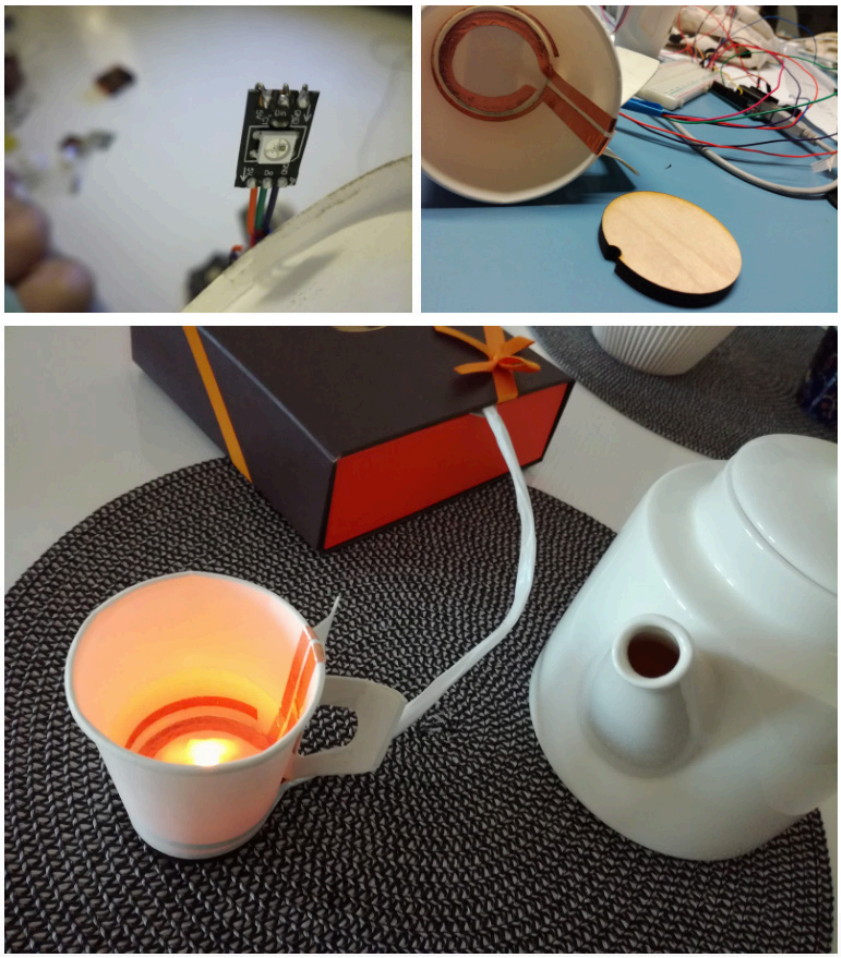

Figure 6.2.1: Prototype I

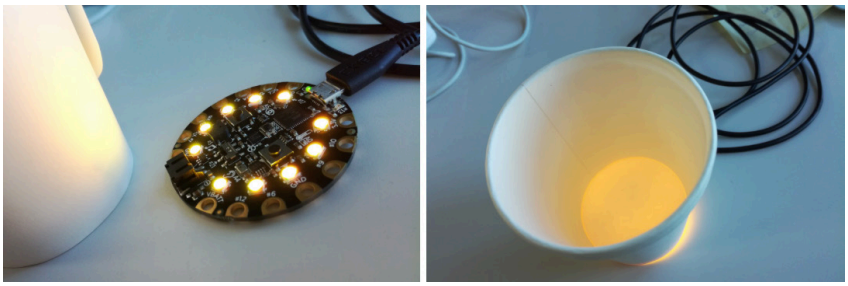

Figure 6.2.2: Noted while assembling 2nd prototype that layering two paper cups create enough diffusion to break the impression of LEDs beneath the cup

Prototype II – interaction with light

Set-up	The same paper cup set-up as in 1st prototype, but combined with Circuit Playground.
Functionality	The light lids up, when liquid is poured into cup, and follows the movement when cup is tilted (i.e. light falls to the lowest point)
Findings	Light following the motion adds to the believability of liquid being light. Diffuser is needed below the cup bottom, in order to make light pleasant and diminish the perception of leds beneath the cup.

Prototype III – sensor inside the cup

Set-up	A glass cup, food safe eTape liquid level sensor, a Moccamaster outlet pipe (posing as a tea infuser with intention to case and hide the sensor), Circuit playground
Functionality	The same functionality as in prototype II i.e. the light lids up, when liquid is poured into cup and follows the movement when cup is tilted.Using this sensor also allows detecting the liquid level and utilising that for interaction.
Findings	Using the eTape liquid level sensor to detect the liquid dictated the cup to be large enough to hold a 13 cm sensor, thus affecting the amount of drink served as part of the experience, and the length of the experience in time, and finally, impacting the nature and contents of the experience as an event. However, the prototype test identified a real obstacle of using eTape sensor as it does not detect the amount of liquid under one inch level. As the Drinking Light experience relies on fast response of emergence of light in the cup with liquid, with this limitation the eTape sensor proved not to be a viable solution for implementing the cup.

Prototype IV – attempt to simplify the design

Set-up	A glass, DFRobot's non-contact water / liquid level sensor, Circuit playground, 16 LED Neopixel Ring
Functionality	The same functionality as in prototypes II and III i.e. the light lids up, when liquid is poured into cup and follows the movement when cup is tilted.
Findings	The error made with this prototype was not correctly performing technical testing in the beginning of development. Although the basic functionality seemed to work in the initial tests, it was later confirmed that the sensor is not sensitive enough to identify a small amount of liquid. The error was due technical inexperience, and caused significant time loss. The sensor itself is somewhat bulky cylinder with 28mm of diameter, and 17mm of height adding considerations to the design of cup and especially coaster's appearance. The Neopixel ring was added mainly in order to place LEDs around the bulky sensor, and to freely adjust their distance from the glass bottom.

Final Demo Prototype

Set-up	A glass, SparkFun MAX30105 Particle Sensor, Circuit playground, 16 LED Neopixel Ring
Functionality	The same functionality as in prototypes II and III i.e. the light lids up, when liquid is poured into cup and follows the movement when cup is tilted. If placed looking up from the cup bottom, the sensor would identify the amount of liquid also. However, in order to hide the sensor as far as possible, and to allow the light to freely pass through the bottom, in this case the sensor was placed against the bottom of the outer side wall of the glass.
Findings	The basic functionality works in this setup and thus provides a viable, foodsafe solution for implementing the Drinking Light cup. The particle sensor provides accurate and fast detection of liquid, when placed on the outer surface thus offering a food safe solution for the implementation. This setup was selected for the demo experience cup.

6.3 Producing the demo cup

Several factors were considered while selecting the glass to serve as basis for the cup. To ensure that the light would shine out as much as possible, glass as the material was chosen. To highlight the light, especially frosted glasses were searched for producing the demo cup. After looking into several different option, the Frosted glassware series by Stelton was selected for the purpose, as it had several good qualities. Firstly, the series provided consistent and stylish bases for both the cup and the pitcher. Secondly, the relatively small size of the glass seemed perfect for offering a taster of light, and also the dimensions were well in line with the size of the electronic components. Finally, the frosted gradient design of the glass highlighted the light beautifully (Figure 6.3.5).

The cup bottom or coaster needed to fit all the electronics inside while appearing as intended part of the cup design. The coasters were CNC cut from pieces of birch wood glued together, and then hand sanded with three different sanding papers (grits 120, 180, and 240), and oiled with colourless Osmo wood finish in order to achieve smooth and soft finish (Figure 6.2.3). The design was decidedly simple with straight cylinder external shape and the form was kept as small as possible while enclosing all the necessary electronics.

The coaster was designed for non-contact liquid sensor in mind. However, discovering functioning sensor (Sparkfun MAX30105) only on few days before the Kynä & Paperi trial allowed no time for reproducing or significantly altering the coaster. Thus, the existing wood piece was restudied, and ultimately reinvented by turning it upside down in order to fit the sensor beside the glass in order to leave the bottom clear for the light to shine through without hindrance (Figure 6.2.4). As the trade-off for this decision, the design of the cup became slightly uncentered as the glass with the sensor attached on side could not fit in the middle off the coaster. The off-centredness of the cup is not ideal, but, in this particular case, creating the best possible conditions for showcasing the light weighted more important than the aesthetic attractiveness of the vessel itself.

To hide the electronics from the sight a ring of plywood was sawed and sanded in shape. The ring was later replaced for the Arabia event with tidier laser-cut white acrylic ring, which also served to block any possible liquid dripples from reaching and harming the electronics underneath. Three pins moulded out of Sugru silicone paste were glued on the bottom of the ring for securing the wood bottom to the glass as the rubber pins

Figure 6.3.1: The wood coaster was CNC cut and then finished with sanding and oiling

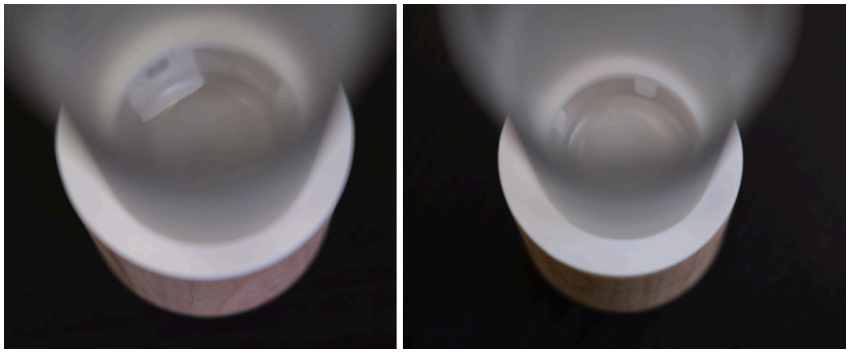

Figure 6.3.2: White Sugru paste was used to hide the sensor as much as possible and to create the pins holding the glass and wood coaster together. White acrylic ring hides the cap between wood and the glass. The glass is slightly off-centered due the space required to fit the sensor beside glass. The bottom of the glass, however, remains clear of barriers to allow the light to shine through.

Figure 6.3.3: Steps in producing the proto diffuser for the LED

Figure 6.3.4: Parts of the demo experience cup and assembling them

Figure 6.3.5: The final demo cup

become tightly pressed between both the glass and wood parts when assembled (Figure 6.3.4).

Circuit Playground was chosen as the platform, because of its relatively small size and inbuilt accelerometer. The particle sensor was attached to the glass with white Sugru paste in order to hide the red electric board as much as possible (Figure 6.3.2). Sugru was chosen for its non-conductive qualities, and easy applicability and removability. While gluing the sensor to the glass the functionality was tested by pouring liquid in the glass and observing that the setup functioned correctly.

As the power source, small lipo batteries were chosen mainly for their applicable size and easy connectivity to the Circuit Playground.

A diffuser was needed to hide individual led lit lights, and to dissolve the perception of electric lights placed under the glass bottom. For the prototype used in the demo experience, diffuser was assembled from a white cardboard paper cup bottom, tissue paper, and stretched on the other side of the cup bottom with help of double-sided tape wrapped around the perimeter. The layers of tissue paper and cardboard are kept ~5 mm apart by the shape of paper cup bottom (Figure 6.3.3). The separate layers increase the rate of diffusion, but not to the extent of completely hiding the animated dripple feature based on the position of the cup.

White cardboard with black masking tape was also used to hide Circuit Playground from showing from the bottom of the wood coaster and to prevent the light from shining through the bottom.

Conducting the user study

The concept of Drinking Light was tested in action with organising demo experiences. This chapter describes conducting a user study on the Drinking Light experience via testing the experience, observing the user experiences at demo events, and by collecting user insight with AttrakDiff evaluation, short structured questionnaire, and interview with participants.

Figure 7.1.1: Testing Drinking Light Aabia Campus

7.1 Testing for the experience

Due to delays in the thesis schedule, testing the demo experience took place in late March 2018, and thus the context differentiated from the darkness of the Nordic November–January, the main season intended for the Drinking Light experience. In addition, the early spring 2018 proved to be unusually sunny. As the originally intended demo experience space in the Kynä & Paperi Cafe in Otaniemi was light and bright, an over-looming canopy structure was added to the spatial set-up. The canopy aimed both to represent November, and make a reference to a nest-like play hut, while simultaneously blocking some of the external light, and offering a form of transition as well as feeling of privacy for the participants from the regular shop surroundings.

Due to technical setbacks with producing a working proto cup, the first intended demo experience on 19th–22nd of March was transformed into a technical development lab. There the focus was more on developing the cup, in addition to making observations of the user interactions and experiences rather than conducting an actual user study.

During the Kynä & Paperi event, the canopy divided opinions: some commented that it made them nervous and hesitant to step in, while one of the participants commented that it was good for dimming the space and showcasing the light. The same participant also noted that an even darker space could enhance the effectiveness of the experience. Sitting on the floor was also found uncomfortable for some participants, and two of three would have preferred stools to sit on.

During the testing it was also noted that the participants did not finish the drink, and thus the light remained on. This could be attributed to the taste of the drink, which in reality was very mild birch sap: all three testers thought it to be water. This interpretation might have been strengthened by the narrative offered for them as the light having been collected from ice of the lake 'Kilpisjärvi' that had encapsulated the sunlight from the very first spring sun after the winter.

Kynä & Paperi induced comments for the cup form. One of the test guests commented that the effect drink being light would have been more convincing, if the light came from the middle of the cup bottom. In the test proto, there was a slightly darker spot in the middle due the use of the led ring to enable the dripping effect to the light as it was tilted. The participant, however, found this feature also appealing and recommended keeping that as well. The gradient of opacity in the glass was also commended as a feature. Another test guest asked about the blob that was visible through the glass bottom hiding the

sensor. The same guest commented having actually expected to see light within the liquid also as it was poured from the neck of the bottle to the glass, and was somewhat disappointed that this did not happen. This is apparent miss in the chosen glassware design, and will be considered in the further development.

The technical difficulties faced during the Kynä & Paperi trial were mainly caused by inexperience, and could have been avoided with more careful planning. For example one hurdle was that the Circuit Playground used for controlling the electronics inside the cup, could not be used for charging the lipo batteries. This was clearly stated on the product information, but missed amidst the rush to get things ready for the testing. As a backup, two 3V coin batteries were used instead, but these ran out of power quickly and could last only for one trial at the time. In addition, the battery running down gradually changed the colour of the light to reddish shade, and thus it proved hard to match the colours of the light in the pitcher and cup. The disparity in the colours of light in different tableware broke the illusion of the same light being poured from a vessel to another.

7.2 The second testing and demoing the experience

As during the first trial the elements, and especially the electronics, were not yet mature enough for evaluating the experiences evoked by Drinking Light, another demo experience space was quickly organised at the Arabia campus in Helsinki on March 26th–27th of 2018. For this event the Cultural Services department's personnel and students from Metropolia University of Applied Sciences were invited to take 10–15 minutes off from their regular campus activities to test drinking of light.

The demo experiences were mainly organised in a dimly lit, cosy lounge area easily accessible. In addition, five demo experiences were held in other spaces: four in the kitchen, and one in the personal office room of the participant to accommodate her schedule. The contexts of offering the light for drinking varied: four guests participated during their lunch break, four during the afternoon/evening before heading home, two in the evening amidst working on school projects, one between meetings, and one in her office just before wrapping up the day's work. Especially, the latter two commented that the experience was refreshing, and offered a moment to relax.

After the Kynä and Paperi observations, some changes were made. Firstly, the canopy structure was disbanded as the lounge space already quite dark to begin with. One of the participants, however, commented that a darker and more tranquil place would have strengthened the experience.

Figure 7.1.2: The colour of the light transformed into increasingly red shade as the battery from the bottle ran out, this made it hard to match the colours between the bottle and the glass

Figure 7.2.1: Demo of the experiential event was organised in Arabia Campus

Secondly, a combination of elderberry juice and mild mineral water was used as the drink instead of the birch sap. Also, the narrative was altered slightly to describe the light as Spring light collected from a place where the snow has already started to melt and where the first flowers (coltsfoots) had started to grow, thus giving the light both floral, and mineral hints in the taste. Modifying the drink aimed to improve the taste and make it more distinguished in order to be more enjoyable for the participants. This seemed to work to an extent as in Metropolia majority of the participants drank the whole portion, and one even requested a refill to see, if the light would lit up again.

Those that took only a sip out of the glass, commented that the light tasted like water, expecting a bolder taste. Also the cleanliness of the cup concerned two participants, and they dared only to try the drink after being assured that the cup was clean. Explicitly cleaning the cup before offering it to the guest seems like a good addition to consider – similarly to the procedure followed in Japanese tea gathering. In future, serving several different lights as tasting menu can be used to emphasise that the drink is intended to be finished (which will in turn enhance the experience by turning off the light). In addition, the development of the taste is inherently important.

7.3 Collecting user insights

During the design process of Drinking Light, the overall concept and prototypes I and II were presented to others on several occasions within the Aalto University, and were well received. However, only small scale user tests were conducted before the demo experience, and mainly at the very end of the design process. This can be considered a risky approach, especially, when considering the intrinsically user centred nature of an experience, but was dictated by the delays of producing a working prototype.

The user study of the Drinking Light experience is based on information gathered from AttrakDiff evaluation questionnaire, a short specifically constructed questionnaire and short interviews with participants conducted annexed to the demo experiences in the Arabia Campus. The combination of these information gathering means was chosen in order to gain a snapshot of the experience with a validated evaluation method (AttrakDiff), as well as to deepen that image with a few open questions and finally a short transcribed interviews specifically designed for the case. Collecting user experiences and insights aimed to be as convenient as possible for the participants.

The AttrakDiff is based on a hedonic/pragmatic model of user experience, which assumes people to perceive interactive products along two quality dimensions, namely pragmatic and hedonic. The pragmatic quality includes evaluated product's perceived ability to support practical tasks, the do-goals, and thus indicates the product usability. The hedonic quality, in turn, summarises the perceived ability of the product to support the be-goals i.e. to create positive experiences through need fulfillment (Hassenzahl 2010, p. 49–50, 52).

The questionnaire was filled out in English, but the participants were given a chance to check the meaning of difficult words in case needed. The user study was conducted on March 26th and 27th at Metropolia University of Applied Sciences, and with a total of twelve participants. Five of these were recorded on video (Figure 7.3.1).

All participants had connection to the culture, design or arts, and two thirds of them were either designers or studied design. Thus, drawing general conclusions from this sampling is not possible or wise. However, as Drinking Light aspires in future to develop into an event format, it seemed justifiable to test the experience with a group of people that frequently attend similar kinds of events, and these results can be seen to provide implications on how such event would succeed. The age of participants varied between 22 and 66 years; eight of them were women, and four men. This small sampling raised no significant differences in the experiences in between the different ages or genders.

Figure 7.3.1: Screenshots from videos documenting the demo experiences

User study results and analysis

This chapter describes evaluating Drinking Light experience and its individual elements based on conducted and analysed user study and general observations made during the demo experience.

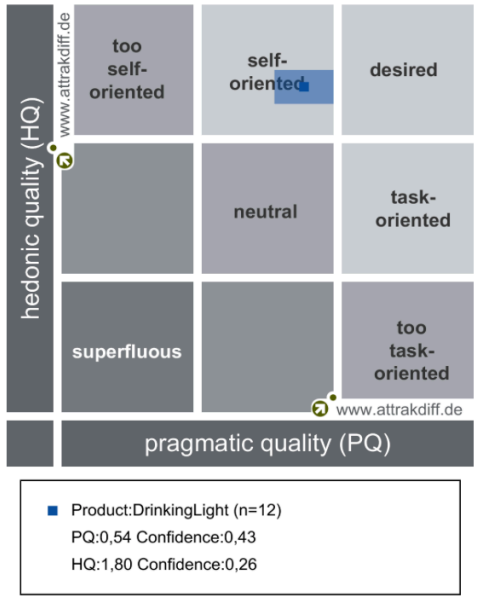

Figure 8.1.1: The portfolio presentation created automatically by the AttrakDiff online tool based on the responds. Small blue square marks the average how Drinking Light experience situates in the terms of hedonic and pragmatic qualities; the lighter blue confidence rectangle shows the variation in the evaluation ratings.

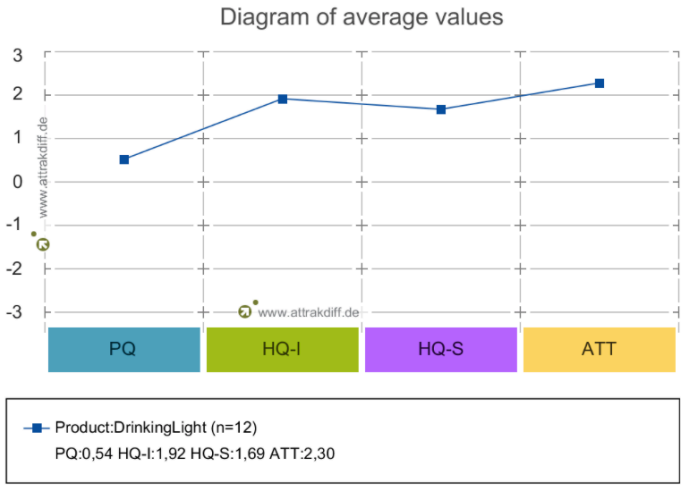

Figure 8.1.2: Visual analysis of the average values automatically created by the AttrakDiff online tool. Drinking Light received high score in Attractiveness, and both Hedonic sub-qualities: stimulation and identity, the pragmatic quality however portrays relatively lower scores.

8.1 Results and reflection from the AttrakDiff

The responses to the AttrakDiff questionnaire were analysed and visualised with help of the online tool provided by the questionnaire developers (http://attrakdiff.de/). After filling out the data in the system, the tool created a visual analysis of the results. The responses were on the general level fairly aligned from all twelve participants, as can be seen in the Figure 8.1.1, which presents relatively small confidence rectangle (i.e. the light blue rectangle). The standard deviation between replies was ≤ 1 in 15/28 of the word pairs, and exceeded 1,5 in five of them.

The experience of Drinking Light was perceived as very positive and attractive by the participants. All participants were willing to recommend the experience to a friend. In light of Drinking Light primarily intended as purely entertaining experience, this result encourages continuing development of the concept. Novelty has been previously noted to potentially suggest high hedonic quality (Hassenzahl 2010, p. 50). The positive reception can also be seen in the diagram of average values from the AttrakDiff evaluation, where only the Pragmatic Quality receives relatively lower marks. (Figure 8.1.2) The visual analysis of the word – pairs illuminates some potential factors for why this might be (Figure 8.1.3).

The responses to the word pairs evaluating the Attractiveness and the Hedonic sub-quality of identity seem well-aligned and highly positive. Under Pragmatic Quality the visualisation shows lower scores. Especially the unpredictability of the experience is clearly visible in the AttrakDiff evaluation. It also portrays as the only word-pair that correlates negative in Drinking Light experience within the AttrakDiff evaluation. At least three different interpretations can be made from this: 1) the novelty of the experience makes it surprising and unpredictable for the participant, 2) the malfunctions of the proto cup made the experience somewhat unpredictable, or 3) combination of the former two. Two of the user study participants explicitly stated that they were foremost surprised by the cup lighting up as the drink was poured in to the cup. On the other hand, in the open questionnaire two other participants mentioned that the light turning momentarily off while they drank, although there was still liquid in the cup disrupted their experience. Thus, it seems plausible that the rating is resulted from both factors, and to confirm the results on this point, a re-test should be conducted with a prototype without any technical difficulties.

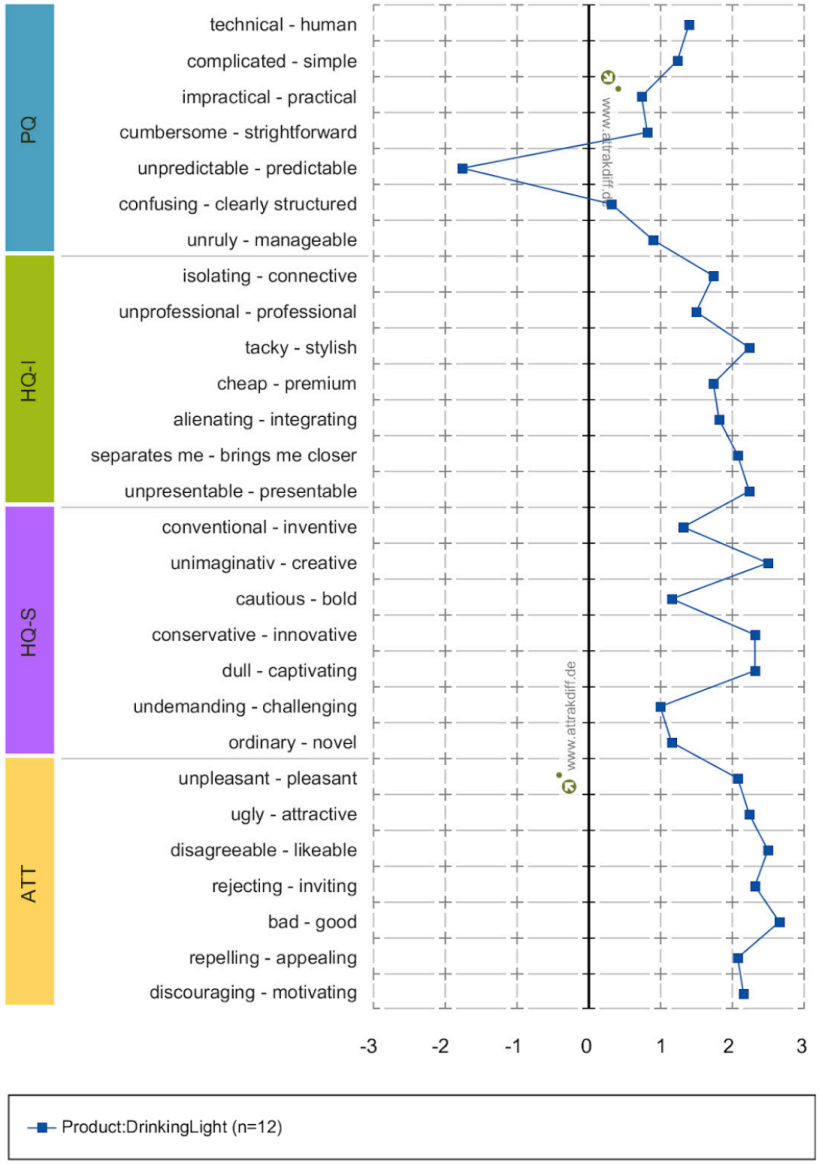

Figure8.1.3: Visual analysis of the individual word pairs automatically created by the AttrakDiff online tool.

When examining the individual responses, the word-pair that divided the impressions most was whether Drinking Light was confusing or clearly structured. One of the participants noted that she was a bit confused by the light, and how the effect was done, but on the other hand found the concept quite straightforward. Another stated that the experience was peculiar as although it was clearly a make-believe fairytale, it still felt real to an extent and spurred imagination of the light entering the body and going through the throat, and the pharynx to the stomach and staying there with you.

The perception between the human and technical also had some division between participants, although the majority interpreted Drinking Light to be more human. Different approaches were also seen in the way participants first interacted with the cup. Several sipped it simultaneously closing their eyes seemingly enjoying the moment, and perhaps even caught in the narrative of the suggested alternative reality. Two of the participants went straight into examining the cup and aiming to understand, how it worked, looking for a sensor and the light source. Even these participants, however, were seemingly surprised and taken by the light litting up.

The responds to the word pair 'Separates me from people – Brings me closer to people' focused clearly on the latter end of scale, with only one of twelve rating the experience in the middle. This seems curious as the demo experience itself was not highly a social event with only one host and guest at the time. One of the participants commented that the experience itself felt highly personal. Nevertheless, previous studies have shown that aesthetic, and fictional narrative experiences connect to empathy skills, and empathy felt for other people (Bal et al. 2013). Arguably, Drinking Light as a narrative experience of a kind may function similarly to activate imagination, and strengthen the felt connection to others as this limited sampling indicates. This would be highly interesting topic for further studies.

Within the Hedonic sub-quality of Stimulation portrays two groups in the combined responses. Creative, innovative and captivating received high scores on the AttrakDiff evaluation. The four word pairs on conventional – inventive, cautious – bold, undemanding – challenging, and ordinary – novel received clearly positive, but noticeably lower scores than the previous group. Also, individual responses varied in the conceptions between undemanding and challenging, although the experience did not require much from the participant, many still rated it challenging. This can be read as a mental challenge caused by novel experience questioning the usual reality.

The most unified views from all participants regarded the word pairs 'bad – good', 'innovative – conservative', 'dull – captivating', 'likeable – disagreeable', and 'unimaginative – creative'. In these, the scale nearing the highlighted ones were preferred by all participants. A curious deviation from mean was noted in the word pair pleasant – unpleasant, although the majority found the experience very pleasant, one participant rated it fairly unpleasant. As the other ratings and comments in the questionnaire were positive towards the experience, and the same participant would have recommended the experience for a friend, it can be that the experienced unpleasantness was caused by being video recorded (although agreed with the participants beforehand) or simply marked by mistake. Nevertheless, the experienced pleasantness would be interesting to study further with a larger sampling.

8.2 Observations and comments on the Drinking Light elements

The functionality of Drinking Light elements were observed during the demo experience. In addition, the demo participants proposed ideas for the further development. These notions are compiled in the following:

8.2.1 The narrative

The narrative seemed to work well for the demo experience, and provide a context and needed transition for the experience. Several of the participants commented that they liked the narrative, and three specifically expressed that the story strengthened their experience with Drinking Light. One guest even asked whether the tribe of light gatherers actually exists.

8.2.2 The light

As expected the light and interacting with it was key feature and central piece of the experience. The cup lighting up and turning off with the liquid being poured and drank seemed to evoke interest and imagination in all twelve participants. Unfortunately, due technical difficulties, the light unintendedly flickered on couple of occasions during the demo experience and one time even turned completely off although there were still liquid left in the cup. This somewhat disrupted the experience and was also noted by two of the participants in their assessment - even though, the malfunctions were explained to the guests as unpredictability and playfulness of the light as an attempt to keep the overall narrative of the experience coherent. On the other hand, four participants men-

tioned the light itself as the main experience strengthening element, and were especially taken by the light going out as the drink was finished. Several of the participating guests commented that the colour of the light supported the story and fit in well with the taste of the drink.

8.2.3 The drink

The drink divided opinions and was experienced in surprisingly different ways by the demo participants. Two dared only to take a small sip, one of which commented that it was rather disappointing that the drink was only water (in reality, it was elderflower juice). One commented having expected a salty taste to align better with the concept of light. Several others commented that the taste went on well with their expectations, and complemented both the narrative and the colour of the light. Misinterpretations with the flavour may be explained by flavour perception being a result of multisensory interaction with multitude of impacting factors, and thus can easily be affected (Spence 2014, p. 330–331). Further testing and developing the drink would thus be both highly interesting and beneficial to go further with concept. The idea of organising light tasting event with different lights was well received, and two of the guests explicitly wondered whether the drink would have tasted different, if the colour of the light had been different.

8.2.4 The cup and the pitcher

The frosted design of glass was commended to showcase the light very beautifully. Also the cohesion and similar design between the bottle and glass was favourably noted. The use of wood material divided opinions, four explicitly admired the feel and the look of the wood, but one commented that the bottom should have been smaller and preferably made of something else such as ceramics. One of the participants, a design lecturer, even extended an invitation to join an excursion to Nuutajärvi later this spring to continue the work on the glassware for the piece, a valuable opportunity for further development.

8.2.5 The interaction

Aside the previously mentioned occasional flickering malfunction with the interaction with light, the interaction worked relatively well. None of the participants, however, made note of the animated movements of light as the cup was tilted and moved. Potential explanations for this are that the time was fairly short and a multitude of different things were happening simultaneously. Only few seemed to look at the cup while drinking,

which was little unexpected as the height of the glass would have allowed that. Another potential reason is that the shape of the cup combined with the diffuser and hidden sensor made the effect fairly subtle, and easily unnoticeable. A cup with larger bottom diametre might benefit more from the animated feature.

8.2.6 The host

The role of the host seemed important for the experience. The task of the host was to explain and offer a context for what was happening as well as to improvise as plausible explanations as possible, when something went wrong in order to maintain as much as possible from the experience: in a similar manner that is done in a Japanese tea gathering. In the demo, the situation was also slightly altered from the original plan as there were only one guest at the time instead of the intended two. This was due one wire breaking in the other cup in way which was too difficult remove and resolder on the spot, and thus only one cup remained in use. This was a pity as having the opportunity for guests to interact with each other would have been interesting to observe as well. Thus the role of the host became even more important. For the demo experience the choreography of host's actions was kept fairly simple, consisting only of sharing the story, placing the tableware on the table while the guest listened with eyes closed, pouring the light, and conversing over experience of drinking light. This appeared to be sufficient for the short 5–10 minute experience.

8.2.7 The setting and location

Discarding the canopy structure from the demo experience set-up appeared to include both benefits and setbacks. On the positive side, people seemed less nervous to participate than in Kynä and Paperi; this, however, might have been partly affected also by the host's demeanour as the elements were now much more reliable to work as intended. On the negative side the added component of shelter and privacy seemed to be missed in some cases as two guests mentioned that external noise and movement disturbed their experience. Noteworthy is that two participants with the tightest the schedules both commented afterwards that they found the experience refreshing, and found it to be a brief getaway amidst of the hectic day. These experiences follow the initial thinking behind the concept, and would be compelling to investigate further.

Four participants saw the Drinking Light concept as potential also for high-end restaurants to enhance their eating experience. Another three found opportunities to apply the concept to yoga exercise instructions or towards the realms of the new age or light

treatments. One in turn suggested a collaborative art piece with different types of lights available for testing and interacting. Majority of participants seemed intrigued by the potential applications for the concept.

8.3 Limitations of the user survey and themes for further study

In addition to the previously mentioned sampling of participants either working or studying in the field of culture, the demo experience provided observations of Drinking Light only as a novelty experience. None of the participants had experienced a similar design concept before, and it is likely that their responses might alter had the concept been more familiar. The ways to nurture interest and positive experience beyond the initial surprise requires further thought and user study to be conducted within the future development of the concept. The surprise aspect of Drinking Light may be compared, to an extent, with experimental gastronomy, which mainly produces memorable one-off experiences that would not work for the second time (Spence 2014, p. 380). Drinking Light, however, arguably obtains potential to work beyond the initial surprise.

Although the experience can be expected to change with repetition, that is the case with any service, art piece, or product; they all alter and re-emerge as more or less different, individual experiences each time they are revisited. A potential way to prolong the longevity of the Drinking Light experience, would be to develop it towards a sort of a ritual or practice, building upon the motivation, the be-goal driving the design. The ritual in this case means a seasonal event for enjoying the light, rather than decidedly spiritual ritual. Even as the idea of a series of Light Cafe events held yearly during October–January with changing menu of lights to taste seem feasible enough, further study continues to be required on the changes in perception and experience of the event, when re-experienced.

9

Conclusions and discussion

This chapter compiles the views for future of the Drinking Light, as well as the thesis conclusions based in the theoretic exploration, the practical design and implementation process of Drinking Light, and the evaluation conducted on its results.

Figure 9.1.1: Drinking Light

9.1 Conclusions

The current sphere of the Design for Experience seems fragmented and full of rather general, and partly overlapping concepts. The concepts and categorisations can aid the design process by offering aspects to consider, but no specific guidelines and guarantees are offered. Design for experience has no formula to follow. Rather it seems like a journey beginning with setting a clear overall vision based on an identified existing need, and then carefully considering, how that can be manifested and enhanced by introducing, designing, and—perhaps most importantly—aligning the supporting elements, and their interconnections.

Even though developing the cup required large amount of design effort and time, it only provided one component for the overall experience, albeit being an important one to get right. With this said, each chosen technical solution brought both affordances and limitations to be weaved into the design for the experience. Much like with any design, the key in this process was to remain true to the vision, to the underlying user motivation, and based on this reflect, which aspects could be met with compromise and which should be hold on to even with cost of added time in development. As the concept and aim of Drinking Light was exceedingly simple, this was relatively easy to keep in mind. On the other hand, the simplicity of the concept meant that there was nowhere to hide, the resulting design would either work or not.

When reflecting the process of developing the Drinking Light experience up to this point, the following approaches were found useful aids:

- For identifying the elements required for conveying the experience, investigating similar experiences and looking into potential experience patterns provided both inspiration and insight. Familiarising with different tea gatherings and tasting events provided both benchmarks and examples of practical implementations, but also general notion of a potentially feasible pattern to apply for structuring the experience. Looking into Mad Hatter's Dinner party enhanced the idea of narrative in Drinking Light, Ultraviolet inspired with it blank canvas for the media content.

- For the alignment of elements, two frameworks proved useful in the process of developing Drinking Light: Hassenzahl's three level goal hierarchy with be-, do- and motor-goals, and Frens' framework of exploration for rich interaction. Although the interaction in Drinking Light is fairly simple, the latter provided excellent help in structuring ideas for the functionalities, the form and the interaction of the piece,

and aligning them vertically in relation to each other. The goal hierarchy, in turn, also helped to evaluate the elements by clarifying the overall vision and aligning them horizontally in terms of the underlying motivation of the design.

- The validated AttrakDiff evaluation questionnaire proved highly useful in assessing the successfulness of the demo experience and feasibility of the overall concept. The complementary open questions could have been developed further, and during the analysis of the results, several aspects were found to require further study.

- Reading into science behind multisensory eating experiences when the overall concept of Drinking Light was already fairly developed gave also ideas for further investigation and study based on the gastrophysics.

Although Drinking Light is quite specific case study, and thus the design process can hardly be applied to another design endeavour as is, overall combination of these frameworks and approaches may be useful to consider. Based on this thesis work, especially the combination of methods 1) to vertically align the experiential elements guided by the identified underlying motivation (Hassenzahl's three level goal hierarchy), and 2) to horizontally align them in relation to each other (Frens' Framework of exploration for rich interaction) seems recommendable. The observations made during the demo experience support, that all designed Drinking Light elements contributed towards the desired experience.

Given the limitations of the user survey conducted, no conclusive argument can be stated of Drinking Light's successfulness beyond that of a novelty experience. The positive initial response, nevertheless, supports continuing with the concept. Based on the AttrakDiff evaluation, and individual participant responses confirm that Drinking Light succeeded in creating an experience of drinkable light—and that provides an excellent starting point for future development.

9.2 The future of Drinking Light

As the response from demo experience confirmed the interest towards the overall concept, the story of Drinking Light is likely to continue. The discussions during the demo experience opened several interesting opportunities for continuing work with Drinking Light, such as potential participation in annual Arabia Street Festival and possibly producing custom glassware for the experience at Nuutajärvi later this spring. The potential

opportunity for full control over glass design: the size, shape, and pattern is highly intriguing. In addition, and as previously described, conducting user survey as part provided multitude of ideas for future development of Drinking Light as well as for further study awaiting to be tackled upon.

Looking into examples and studies conducted within gastrophysics seems potent for gaining further insights and guidance for the development. Gastrophysics, in short, constitutes for the range of tools, techniques and ways of thinking about diner's response by means of evaluating the impact of different factors on the multisensory experience. The factors include both internal and external to the food or drink itself (Spence 2014, p. 47). As this thesis has produced a working prototype, created premises for the demo experiences, as well as via user study provided a snapshot of the feasibility of the overall concept, the logical next step is now to turn focus into perfecting the individual elements that factor into the holistic experience.

On the practical level, the initial next steps include polishing the technical functionality of the current cup setup, fine-tuning the placement of lights in the bottle, and continuing the development of the drink. In terms of developing the event concept, the sensor currently used in the cup setup allows the sensing temperature as well as identifying the liquid, which provides technical means for introducing a tasting with more than one light during session.

Currently still uncharted, a multitude of application possibilities for the concept seem to reside in potential collaborations with restaurants, events, or beverage or ceramics companies. One of the initial visions for Drinking Light to be included in the programme of light festival, such as Lux Helsinki still stirs imagination. In order to be realised, however, further development and establishing collaborations would be needed in order to develop the tested event concept and elements to cater for larger number of participants. Even though, Drinking Light does not aspire to become a mass event—that would most likely mean losing its charm—to function as part of an urban event, number of participants should be moderately increased. Overall, the future of Drinking Light looks bright, although much work is yet required in order to achieve the full potential embedded in the idea.

9.3 Personal reflections

This thesis started as an exploration of doing something that I had never pursued earlier. When I began working with this thesis, the approach and technology of Drinking Light were an uncharted territory for me as a designer. At the time I had very little previous experience of working with electronics, which posed me with the challenge to learn the very basic things like soldering, testing procedures, and understanding the formulation of Arduino code structures as I went along. I cannot claim of having become an expert on these, but all in all my knowledge on the matters has certainly increased, thanks to the advice and tutoring I have received.

Now in retrospect, I find that the goal of this thesis was quite ambitious, and see that I definitely underestimated the technical challenges compared to my skill level at the time. Many rather silly mistakes and errors were made. As the major part of the time went into testing different sensors and attempting to solve the technical challenges, the holistic approach in the design suffered, and the other elements were left with a lesser amount of consideration.

For me, however, the user testing validated my efforts, and confirmed that the concept of Drinking Light entails potential that was and continues to be worth further exploration and pursue. The experience of drinking light was perceived by the demo participants as highly positive, stirring imagination of potential applications, and further developments. One of the participants seemed especially impressed with the concept, and had written down a request that I would continue developing the concept as he believes in the concept and idea. Another invited me to join an excursion to continue work on the glassware with potential craftsmen. Each of these encounters and reactions were experiences that I am likely to remember for a very long time.

Simultaneously, during the user study I noticed the things that could have been improved, such as the slight malfunctions with the sensor and the light, and the peculiar (and likely greatly experience affecting) setting with the camera and light for the video recording of the five experiences. These factors, however, did not seem to translate into the AttrakDiff questionnaire replies, perhaps due the school environment where experiments are allowed, but possibly also due the novelty and strength of the experience of unexpectedly litting light, which was visible on the faces of the participants and in their reactions.

There are questions as well, of course, although none of those were raised during the user study, neither by me or the participants. Is it truly useful to produce another type of novelty cup, and is playing with different senses and creating make-believe narratives not somewhat indulgent, when there would real issues to solve? On the other hand, one can argue that the dark winter requires a touch of magic and fun as well as a quick get away from the stresses of everyday life.

In a way, the outcome of this thesis work was both less and more than what I expected, when starting. Initially, I aspired to create a more polished production, even an art piece as the result. It was not. The process put me face to face with my limitations, but also, on occasions pushed me over them, and showed that it was possible after all. At the same time, in the very end, I found myself genuinely surprised by the effectiveness of the concept, of the story combined with the other elements, and how the people responded to it. Taking this into consideration I find myself unable to be overly disappointed with the apparent imperfections in the process and implementation, as the core—the ever elusive experience—seemed to trickle through regardless of them. For me, that is quite an achievement.

List of references

Altarriba, F., Avdić, M., Erlendsson, A. G., Schlüter, L., & Valkær, T. N. (2016). "The Mad Hatter's Dinner Party": Enhancing the Dining Experience Through the Use of Game Thinking. In D. Koelemeijer, & F. Tachtler (Eds.), *Human nature: Proceeding of the 12th Student Interaction Design Research Conference* (SIDeR 2016) (pp. 126-129). IDM, Malmö University.

Altarriba, F., Avdić, M., Grangaard, A., Schlüter, L. & Neville, T. (2016b, January 28). *The Mad Hatter's Dinner Party - The whole dinner* [video file]. Retrieved March 31, 2018 from https://vimeo.com/153370750

Bal, P. M., & Veltkamp, M. (2013). How Does Fiction Reading Influence Empathy? An Experimental Investigation on the Role of Emotional Transportation. *PLoS ONE*, 8(1). doi:10.1371/journal.pone.0055341

Chado Urasenke Tankokai Finland Association. (2003). *Teen tie*. Retrieved April 07, 2018, from http://www.urasenke-finland.org/chado.shtml

Desmet, P., & Hekkert, P. (2007). *Framework of Product Experience.* International Journal of Design, 1(1), 57–66.

Espadaysantacruz. (2015, March). *Light Kinetics.* Retrieved April 08, 2018, from http://www.espadaysantacruz.com/projects/light-kinetics

Frens, J. W. (2006). *Designing for Rich Interaction: Integrating Form, Interaction, and Function* (Doctoral Dissertation). Eindhoven, the Netherlands: Eindhoven University of Technology.

Hinte, E. V. (2016). *Food design; Exploring the future of food.* Houten: Terra Lannoo bv.v

Hassenzahl, M. (2010). *Experience Design; Technology for All the Right Reasons.* Essen, Germany: Folkwang University.

Hassenzahl, M., Eckoldt, K., Diefenbach, S., Laschke, M., Lenz, E., & Kim, J. (2013). Designing moments of meaning and pleasure. Experience design and happiness. *International Journal of Design*, 7(3), 21–31.

Howells, T., & Hayman, L. (2014). *Experimental eating*. London: Black Dog Publishing.

Kim, J. (2015). *Design for Experience Where Technology Meets Design and Strategy.* Cham: Springer International Publishing. doi:10.1007/978-3-319-14304-0

Korsmeyer, C. (2010). Taste, food and the limits of pleasure. In R. Shusterman & A. Tomlin (Eds.), *Aesthetic experience* (pp. 127–142). New York, US: Routledge.

Lee, N. (2016, July 16). *PROJECT A Light Collector : Seoul exhibition*. Retrieved April 08, 2018, from http://narimlee.com/a-light-collector-seoul-exhibition-2/

Lucero, A., Mason, J., Wiethoff, A., Meerbeek, B., Pihlajaniemi, H., & Aliakseyeu, D. (2016). *Rethinking our interactions with light. Interactions*, 23(6), 54–59. doi:10.1145/3003334

McCarthy, J. & Wright, P., (2004). *Technology as experience*. United States: MIT Press. doi: 10.1145/1015530.1015549

Norman, D. A. (1999). *Affordance, conventions, and design*. Interactions, 6(3), 38-42. doi:10.1145/301153.301168

Rosenthal, N. E., Sack, D. A., Gillin, J. C., Lewy, A. J., Goodwin, F. K., Davenport, Y., . . . Wehr, T. A. (1984). Seasonal Affective Disorder. *Archives of General Psychiatry*, 41(1), 72–80. doi:10.1001/archpsyc.1984.01790120076010

Sanders, E. B., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. CoDesign: *International Journal of CoCreation in Design and the Arts*, 4(1), 5–18. doi:10.1080/15710880701875068

Schifferstein, H. N., & Spence, C. (2008). Multisensory Product Experience. *Product Experience*, 133–161. doi:10.1016/b978-008045089-6.50008-3

Seitinger, S., Taub, D. M., & Taylor, A. S. (2010). Light bodies: Exploring Interactions with Responsive Lights. *Proceedings of the Fourth International Conference on Tangible, Embedded, and Embodied Interaction - TEI 10*, 113–120. doi:10.1145/1709886.1709908

Spence, Charles. (2014). *The Perfect Meal; The Multisensory Science of Food and Dining*. New York, United States: John Wiley & Sons Inc. (Kindle Edition)

Stummerer, S., & Hablesreiter, M. (2010). *Food Design XL*. Vienna, Austria: SpringerWienNewYork.

Teapedia. (2013, September 02). *Chinese tea culture*. Retrieved April 07, 2018, from http://teapedia.org/en/Chinese_tea_culture

Ultraviolet. (n.d.). *Ultraviolet by Paul Pairet*. Retrieved April 01, 2018, from https://uvbypp.cc/

Zampollo, F. (2013). Food and design: Space, place and experience. *Hospitality & Society*, 3(3), 181–187. doi:10.1386/hosp.3.3.181_2

Zampollo, F. (2016, November). *What is Food Design? The complete overview of all Food Design sub - disciplines and how they merge*. Retrieved March 31, 2018, from https://www.researchgate.net/publication/310706545_What_is_Food_Design_The_complete_overview_of_all_Food_Design_sub-disciplines_and_how_they_merge

List of figures

Annex 1 | Summary of considered and tested sensors

	Benefits	Challenges
Capacitive sensor with two copper strips place outside the cup	• Can indicate the liquid level • Requires no direct contact to the liquid • Copper plates are relatively easy to hide within the cup design	• Highly volatile and vulnerable to disturbance (e.g. by touch, movement or temperature), causing unreliability • The plates and wires would need to cased in and protected from external disturbances
DFRobot's capacitative non-contact water / liquid level sensor	• Easy to use sensor • Requires no direct contact to the liquid	• Somewhat bulky sensor • (diameter 28mm x 17mm) placed in direct contact with external cup surface - needs to be hidden within the cup design • Provides no detailed indications of liquid level • Proved ineffective for sensing small enough amounts of liquid
Infrared emitter and receiver	• Requires no direct contact to the liquid • If used solely to detect whether liquid is place within the cup or not, the sensors required are small small and easy to integrate within the design • With more sensors, can also indicate the liquid level	• According the tests, infrared light was able to pass through the glass cup, but there was not clear enough difference in the sensor values with or without the liquid for the system to work reliably • External disturbance caused unreliability

	Benefits	Challenges
Pressure sensor	• Requires no direct contact to the liquid	• Picking up the cup interfered with the reading • Having an easily malleable cup (e.g. paper cup) would help - tradeoff, however, would be the durability
eTape Liquid level sensor	• Indicates the liquid level • Reliable and relatively easy to implement	• Sensor needs to be placed within the cup and disguised • Proved unreliable with the first inch of liquid
Closed circuit method (two inductive plates inside the cup to be connected by liquid)	• Successfully implemented with prototypes I and II; also the most popular DIY method presented online	• This method rests on having minor electric current pass through the liquid while it is to be consumed, although unnoticeable for the user. • Although can be created in food safe manner, would require a custom-made cup, which proved to be too time consuming option within the timeframe of this thesis
Sparkfun's Particle Sensor	• Reliable and relatively easy to implement • Detects also the temperature, which can be used to differentiate different drinks/light • Indicates the liquid level (if placed of the cup bottom)	• Sensor needs to be hidden from sight

Annex 2 | Open question responses for the questionnaire

How was your experience with Drinking Light

- Interesting and surprising
- Virkistävä, valaistunut / Refreshing, enlightened
- Mukava hetki kiireen keskellä / A pleasant moment amidst of busy schedule
- Mielenkiintoista ja miellyttävä kokemus. Sopisi ryhmätestaukseen. / Interesting and pleasant experience. Testing with a group would be suitable
- It was different experience of drinking. Cool idea, if you would really be able to do that. As it is could work in premium restaurants.
- Nice
- Fun, no barriers! Opening, stopping!
- A very sweet experience, never had light before in me, feels refreshing
- Surprise, interest
- Very nice experience. Beautiful spring light
- Pleasant, lightening
- Stayed wondering if the flavour was different experience with different light

What elements strengthened the experience?

- Story was good and function
- Functional set-up
- Light itself
- This goes inside, the sense of light in you is surprising, of course it is imagination (- or is it?)
- Story of light and people behind it was good
- The fact that both glass and bottle shined, wood material
- Hämärä vahvisti / The dimly lit environment enhanced
- Water
- When the light turned off when empty

What elements disrupted the experience?

- Maybe no being completely prepared (myself) disrupted
- Taste of water
- Technical things are always demanding
- Maybe the fact that the light turned off few times in the glass
- ympäristön äänet, olisi vaatinut rauhallisen ja hämärän ympäristön / the surrounding sounds, would have required a peaceful and dimly lit environment
- Melu häiritsi / The noise disturbed
- Salty water

Other comments and thoughts

- The base part of the glass should be smaller and the material could be something else than wood… ceramics maybe
- Olisi kiinnostavaa kuulla, miten ideaa jatkotyöstetään tulevaisuudessa. / Would be interesting to be updated how the idea will be developed further in the future
- Please continue with the project. The idea is very innovative
- Could be very good for new age people for the ordinary people too :)
- The simple performance for the test is good, you have to stop and then you just fill yourself with light
- Light is energy!!!